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ERRATA.

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Page 78 line 9 for " calcium cyanide " read " calcium cyanamide "

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,, 24 ,, 35 ,, " *Aphelinoides* " ,, " *Aphelinoidea* "
,, 44 ,, 13 ,, " *canadensiella* " ,, " *canadensisella* "
,, 57 ,, 8 before " November 1924 " insert " Verona "
,, 63 line 1 for " Börner (L.)." read " Börner (C.)."
,, 71 2 lines from end delete " a pest of sunn [*Crotalaria juncea*]."
,, 80 line 14 for " [? *Dindymus versicolor*]" read "[*Tectocoris lineola*]"
,, 84 ,, 29 ,, " *Carthartus* " ,, " *Cathartus* "
,, 89 ,, 25 ,, " *Paradris* " ,, " *Paridris* "
,, 92 ,, 16 ,, " this sulphate " ,, " thiosulphate "
,, 105 ,, 22 ,, " *Arthrophylum* " ,, " *Arthrophyllum* "
,, 106 ,, 43 ,, " Schr." ,, " L."
,, 107 ,, 30 ,, " *leacheana* " ,, " *lecheana* "
,, 121 ,, 15 ,, " *Ailomorphus* " ,, " *Aiolomorphus* "
,, 128 ,, 29 ,, " *siberata* " ,, " *siberita* "
,, 129 2 lines from end for " [*Furcaspis biformis*] " read " [*Eurytoma orchidearum*]"
,, 130 line 21 for " *Cerotoma* " read " *Ceratoma* "
,, 131 ,, 13 ,, " *Ballus* " ,, " *Psallus* "
,, 138 ,, 17 ,, " *Annona* " ,, " *Anona* "
,, 147 ,, 37 ,, " *vittelinae* " ,, " *vitellinae* "
,, 152 ,, 42 before " cu. ft." insert " 35 "
,, 164 ,, 15 for " *euonymella* " read " *euonymellae* "
,, 169 lines 20, 28 for " [*Heliothis obsoleta*, F.] " read " [*Diparopsis castanea*, Hmpn.]"
,, 173 line 3 for " pp. 395–306 " read " pp. 395–396 "
,, 174 ,, 16 ,, " *Hectaema* " ,, " *Hectacma* "
,, 176 ,, 23 ,, " A, xii " ,, " A, xiii "
,, 196 ,, 7 ,, " *somnulentis* " ,, " *somnulentus* "
,, 196 ,, 28 ,, " *brevipes* " ,, " *brevis* "
,, 231 2, 5 and 6 lines from end for " *helicometra* " read " *helicomitra* "
,, 234 line 16 for " *Thorictides* " read " *Thorictodes* "
,, 236 2 lines from end for " *Coccolobis* " read " *Coccoloba* "
,, 237 4 lines from end after " Europe " insert " and "
,, 290 line 37 for " *Thryphactothrips* "read " *Tryphactothrips* "
,, 353 ,, 44 delete " sunn [*Crotalaria juncea*] and "
,, 388 ,, 1 for " De Costa Lima (A.) " read " Da Costa Lima (A.) "
,, 388 ,, 22 ,, " Da Costa Lima (M.) " read " Da Costa Lima (A.) "
,, 410 ,, 7 ,, " *coccophilus* " read " *cocophilus* "
,, 412 ,, 38 ,, " *Ericoccus* " ,, " *Eriococcus* "
,, 425 ,, 8 ,, " *lebek* " ,, " *lebbek* "

Page	443	line	5	for	" *tenebroides* "	read " *tenebrioides* "
,,	453	,,	28	,,	" *plebia* "	,, " *plebeia* "
,,	487	,,	8	,,	" 100 "	,, " 1,000 "
,,	538	,,	22	,,	" *pellucens* "	,, " *pellucida* "
,,	538	,,	25	,,	" *notata* "	,, " *sexnotata* "
,,	546	,,	32	,,	" *Jatropa* "	,, " *Jatropha* "
,,	548	,,	9	,,	" *neoartemisae* "	,, " *neoartemisiae* "
,,	548	,,	46	,,	" *fasciata* "	,, " *fascialis* "
,,	569	3 lines from end		for	" Glen "	,, " Glenn "
,,	599	3 lines from end		for	" *Capnodes* "	,, " *Capnodis* "
,,	612	line	11	for	" *moestrum* "	,, " *moestum* "
,,	625	,,	5	,,	" NEWCOMER (P. J.) "	,, " NEWCOMER (E. J.) "
,,	633	,,	26	,,	" *saccharinum* "	,, " *saccharum* "

IMPERIAL BUREAU OF ENTOMOLOGY.

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SERIES A.

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Fruit-fly Investigations.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 4, p. 285. Pretoria, October 1924.

Ceratitis capitata, Wied., has been recorded for the first time from the fruits of *Ekebergia capensis* (a native tree known as the dog-plum) at East London. Another fruit-fly, *Trirhithrum occipitale*, Bez., was recorded in numbers from a wild grape, *Cissus cirrhosa*, which seems to be its exclusive food-plant. *Dacus* (*Tridacus*) *pectoralis*, Wlk., is reported as infesting papaya in the Barberton district. Green fruits are occasionally attacked, and in this case the larvae develop, but are unable to escape; they pupate within the fruit, and the adult dies in the seed-cavity. When ripe fruit is infested, the larvae escape when full-grown. Picked fruits are also sometimes attacked, generally at the end where the stalk has been broken off.

MALLY (C. W.). **A Means of catching the Fruit Nibbler** (*Odontionopa sericea*, **Gyll.**).—*Jl. Dept. Agric. Union S. Africa*, ix, no. 4, pp. 301–305, 3 figs. Pretoria, October 1924.

The Eumolpid beetle, *Prasoidea* (*Odontionopa*) *sericea*, Gyll., causes a certain amount of damage to cultivated fruit each year by feeding on the surface of very young fruit, sometimes also attacking the foliage. It is an indigenous South African species, and normally lives on wild food-plants. On ripe fruit the attacked parts appear as large scars, thus destroying much of the export value. Lead arsenate sprays would be practically useless, as even if the trees were sprayed at the beginning of an attack, the beetles would be able to feed for two or three days before receiving a fatal dose, and in this time considerable damage might be done. Tobacco dust has no effect as a repellent. A method that proved very successful is to spread a large sheet of double-width hessian, previously treated with linseed oil, under a tree, after slitting it lengthwise to the middle and mounting it on a long stick at the one end and two short ones at the other. The hessian is coated with a thin layer of tree tanglefoot,

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The tree is then shaken sharply, but not violently, or jarred by tapping the larger branches with the hand or with a padded mallet. This causes the beetles to drop on to the adhesive. The ends of the sticks are then grasped and the sheet withdrawn, still stretched out, and slipped under the next tree. Many trees can be treated in this manner in a very short time. Early morning or late evening would probably be the best time for this treatment, but it may be given at any time of day if there is a sudden attack of the beetles. It is thought that this method might be successful against other insects, especially the bug, *Antestia variegata*, Thb., *Pseudococcinella sexvittata*, Chevr. (striped olive beetle) and *Teleonemia australis*, Dist. (olive Tingid).

Controlling Cotton Bollworms.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 4, pp. 311–312. Pretoria, October 1924.

The cotton bollworms that occur in South Africa are the Sudan bollworm, *Diparopsis castanea*, which has been found in the bolls of a wild species of cotton ; the spiny bollworm, *Earias insulana*, found in several species of *Hibiscus* ; and the American bollworm, *Heliothis* (*Chloridea*) *obsoleta*, which is a general feeder on maize, tobacco seed heads, tomatos, citrus fruit, etc. All three species oviposit on the cotton plant, and the larvae feed mostly on the squares and bolls. Pupation occurs in the soil or on the stem of the cotton plant, so that the larvae cannot be disseminated in cotton seed. Experiments in spraying and dusting against these pests have been very discouraging. Calcium arsenate is to be further tested, and in the meantime the recommendations for keeping down the pests are the choice of soil of a sandy-loam texture, ploughing and disking twice early in the winter (before mid-August), after which the land is left fallow through the winter, the use of good seed planted early, cultivation of the crop, and destruction of any cotton or other food-plant growing outside the cotton field. Ratooning is not recommended, as it allows the bollworms to increase unchecked.

Fighting the Locust in the Bechuanaland Protectorate and South-West Africa (1923-1924 Season).—*Jl. Dept. Agric. Union S. Africa*, ix, no. 4, pp. 324–325. Pretoria, October 1924.

The great difficulties to be overcome in combating the locust invasions in the Bechuanaland Protectorate are described. Although the native chiefs on the Transvaal border gave great assistance, the tribes towards the interior, fearing the extension of operations into the inner Kalahari, throw every obstacle in the way of the work and deny the occurrence of locust swarms. In some parts the transport of poison was impossible, and recourse was had to trenches that were filled in as they became full of hoppers. Other regions are practically uninhabited and waterless, while fresh invasions are constantly occurring from the inner Kalahari, which is as yet unexplored, and in which, with the means available, it was impossible to operate. In spite of these difficulties 24,204 swarms of hoppers were destroyed during 1922–23, and 42,777 swarms in 1923–24. The difficulties in south-west Africa are very similar, and in a large part of the country no operations are possible ; still in 1923–24 70,000 swarms of hoppers were destroyed.

SCHOUTEDEN (H.). **Le Scolyte du grain de Café.**—*Rev. zool. afr.*, xii, no. 4, *Bull. Cercle zool. congo.*, pp. 56–60, 1 pl. Brussels, 1st November 1924.

An account is given of *Stephanoderes hampei* (*coffeae*), which is considered one of the most destructive pests of coffee, taken largely from the work of previous writers [*cf. R.A.E.*, A, xii, 39]. Coffee is the only food of this Scolytid, although it has at times been recorded, probably erroneously, on other plants. The beetles can live, not only on the growing berries, but also on the fermented coffee, and they may be found alive in the sacks of coffee imported into Europe for consumption.

Another Coleopterous pest of the coffee berry, especially in the Congo, is the Anthribid beedle, *Araecerus* (*Araeocerus*) *fasciculatus*, which breeds abundantly on palm nuts in store and is easily captured at light.

BERTIN (C.). **Contribution à l'étude de l'Eudémis en Algérie.**—*Rev. agric. Afr. N.*, xxii, nos. 273–275, pp. 683–687, 697–700 & 716–719, 3 figs. Algiers, 24th & 31st October, & 7th November 1924.

The vine moth [*Polychrosis botrana*] is a comparatively recent introduction into Algeria, where it is causing a great deal of damage to the grape crop. An account is given of the moth and of the injury it causes, and the effect of its attack on the quality of the must is discussed in detail. Various methods have been evolved for completing the process of wine-making from grapes so affected, and some of these are explained. The measures that have been found successful in other countries against the moth are reviewed, and it is hoped that the parasite, *Dibrachys affinis*, may prove a valuable help in controlling this pest. It has been noticed during the past year in Algeria that the larva of *P. botrana* is very susceptible to the action of sulphurous anhydride and that one drop of a solution of it on the body of a larva is sufficient to kill it. Experiments on a large scale are required to determine the best concentrations for use against larvae, pupae and adults, and the effect on the foliage. Hand spraying is the only method that admits of covering the fruit adequately.

SCHWARTZ (W.). **Untersuchungen über die Pilzsymbiose der Schildläuse.** [Investigations on the symbiotic Fungi of Scale-insects.]—*Biol. Zentralbl.*, xliv, no. 9, pp. 487–528, 21 figs. Leipzig, 30th September 1924.

This article deals with the symbiotic fungi of *Coccus* (*Lecanium*) *hesperidum*, *C.* (*L.*) *longulus*, *Saissetia* (*L.*) *hemisphaerica*, *S.* (*L.*) *oleae*, *Eucalymnatus* (*L.*) *tessellatus*, *Eulecanium* (*L.*) *corni*, *Ceroplastes rusci*, *C. sinensis*, and *Pulvinaria psidii*.

HIRST (S.). **Note on the Synonymy and Distribution of** *Tetranychus telarius*, **L.**—*Ann. & Mag. Nat. Hist.*, xiv, no. 84, pp. 621–624. London, December 1924.

Linnaeus included two distinct species of red spider under the name *Acarus telarius*, one being the common red spider of Europe, which is frequently found on hollyhocks (*Althaea*), and is also prevalent in

greenhouses, and the other the lime-tree or linden mite. Hermann cleared up this confusion by creating the name *Trombidium tiliarium* for the lime-tree red spider. It is therefore clear that the name *Tetranychus telarius* should be used for the common European red spider and *T. tiliarium* for the lime-tree mite. Several recent workers however have reversed this, using *T. althaeae*, von Haus [*cf. R.A.E.*, A, xi, 131] for the common red spider and calling the lime-tree red spider *T. telarius*. This change is to be regretted, and it is hoped that the correct name, *T. telarius*, will be used for the common red spider by future workers. In any case *T. althaeae* cannot stand for the species on hollyhocks, as there are many earlier names. Ewing's suggestion that *T. telarius* is the common red spider of North America and that *T. bimaculatus* is a synonym of it is probably correct.

The distribution of *T. telarius* is given with a list of its food-plants. It is recorded on a number of plants in South India, on castor in Iraq, and on cotton in the British Sudan.

MALENOTTI (E.). **Gli endofagi indigeni contro la** *Coleophora laricella*. **(Conviene proprio aiutarne la diffusione ?).** [Indigenous Endophagous Parasites against *C. laricella*. Is it really advisable to encourage their Diffusion ?]—*L'Italia Agricola*, reprint, 7 pp. Piacenza, 15th September 1924.

During an outbreak of the larch miner, *Coleophora laricella*, Hb., in the province of Brescia, the author found by actual tests that any wire gauze with a square mesh of 1 mm., 1·33 mm., or 1·66 mm. width will permit the escape of the parasites of this moth. Permitting the parasites to escape from collected cocoons, even if carried out at a cost equal to the estimated losses, only slightly assists, however, the control of *C. laricella*, because the collected cocoons can only represent about 10 per cent. of the total number.

MALENOTTI (E.). **La Malattia della Mosca.** [Injury due to *Pseudococcus vitis*.]—*Pagine Agricole*, vii, nos. 9 & 10, pp. 1–5, 1–4. Leghorn, September & October 1924.

Pseudococcus vitis, Nied., has been known to infest grape vines near Leghorn and Pisa for at least 30 years. It hibernates in the adult stage, on the stocks in damp districts, and on the larger roots in dry ones. Tuscany has a climate between these extremes, and the position chiefly chosen there for hibernation has not been determined. It is a point of vital importance for planning remedial measures. The author is inclined to think that certain varieties of vine are more likely to be attacked, one factor apparently being a velvety surface of the leaves, which are the chief site for feeding and reproduction. The mealybug prefers shaded positions and appears to avoid those exposed to strong winds. Vines close to the ground are attacked in preference to those trained on trees. The Coccinellid, *Cryptolaemus montrouzieri*, Muls., destroys a certain number of the mealybugs.

In June and July spraying with a petroleum-soap emulsion should be carried out in order to destroy the Coccid, when the sooty fungus produced by it will also disappear. In winter the old bark should be cleared from the stocks, which may then be brushed with a mixture of heavy tar-oil 5 parts, sodium carbonate 2, and water 95. Winter treatment is of greater importance than summer spraying.

THEOBALD (F. V.). **Entomological Department.**—*Ann. Rept. Res. & Adv. Dept. [S.E. Agric. Coll.], 1923–24*, Appx. B, pp. 5–16. [Wye, Kent,] 1924.

Among the most notable insect pests of 1923-24 were Tortricids in fruit plantations, particularly *Tortrix heparana*, *T. ribeana*, and *T. podana*, as well as *Olethreutes* (*Antithesia*) *pruniana* and *Eucosma* (*Spilonota*) *roborana*, which were very injurious to apples and pears, and to a less extent to plums, in spite of thorough arsenical spraying, though carbolineum emulsions destroyed the eggs; two species of thrips, which fed on the blossoms of cultivated blackberries, and to a less extent on wild ones, causing them to shrivel up so that no fruit was formed; larvae of *Melolontha melolontha* (*vulgaris*) (cockchafers), for which the only successful remedy was rolling with a 13-ton steam-roller; *Cydia pomonella* (codling moth) and *Anthonomus pomorum* (apple blossom weevil), both of which can be controlled by sack banding; *Brevicoryne brassicae* (mealy cabbage aphis); *Acidia heraclei* (celery fly), of which there were early attacks, which died out later; and *Pegomyia betae* (mangel fly) and *Atomaria linearis* (pigmy mangel beetle), the latter of which can be largely checked by rolling both ways with a ring roller.

Among the minor pests recorded were *Aspis udmanniana* (loganberry shoot moth), *Barypithes* (*Exomias*) *araneiformis* (small strawberry fruit weevil), *Ptychodes juglandis* (walnut aphis), *Paururus noctilio* (steel-blue wood wasp), *Pterocomma bituberculata* (willow aphis), *Macrosiphoniella sanborni* (chrysanthemum aphis) in glasshouses; and on hops, the weevil, *Plinthus caliginosus*, and *Euacanthus interruptus* (hop jumper), which was very prevalent in some poled hop gardens, doing serious damage and ruining the crop in the attacked areas, though it may be easily controlled by nicotine-soap wash.

Light traps proved of no practical value for winter moths, but were very successful against Tortricids and other moths. The effect of carbolineum emulsions on the eggs of various pests is discussed.

In the course of Aphid investigations, an alternate food-plant of *Aphis grossulariae* (gooseberry aphis) was found to be the guelder rose (*Viburnum opulus*), and the Aphid attacking carrot roots was found to be the same as the one on tulips and other bulbs, *Anuraphis tulipae*, Boy., which is frequently introduced on bulbs from Europe into other countries.

CHRYSTAL (R. N.). *Chermes* (*Pineus*) *pini* (**L.**) **Börner. The Pine Chermes in the Royal Gardens of Kew.**—*Gard. Chron.*, lxxvi, no. 1980, pp. 388–389, 4 figs. London, 6th December 1924.

Spruce (*Picea orientalis*) is the primary food-plant of *Chermes pini*, and upon this the gall is formed. The first stage larval forms are found from September onwards lying singly at the needle bases, where they remain until March or April; they then develop rapidly, becoming mature in about three weeks and laying as many as 500 eggs. Early in May the larvae from these eggs penetrate the young buds, forming galls. In July the nymphs emerge and, after casting the nymphal skin, fly to various pines and lay their eggs, the migration from spruce to pine being completed by the middle of August. From 30 to 60 eggs are laid by each adult, and the resulting larvae hibernate on the young shoots. In March and April they are mature and lay about 150 eggs each, from which larvae hatch in 10 to 14 days. At the end of May about half of these larvae assume the nymphal form,

the remainder developing into wingless stem-mothers, these latter becoming the starting point of new generations of wingless individuals on the pine branches throughout the summer. The winged sexuparae, shortly after maturity, migrate and settle on the young needles of *Picea orientalis*, and there each lays 20 to 25 eggs which hatch in seven or eight days, the male form appearing in this generation for the only time during the two-year cycle. After pairing the female deposits a single egg among the bark scales, which, in about three weeks, gives rise to the larva of the gall fundatrix.

It was observed that in cages the sexuparae were disinclined to settle upon the spruce in the normal manner, an active, migratory flight being apparently necessary.

In the open, for some unexplained reason, considerable numbers of the sexuparae did not seek their natural food-plant, the spruce, but laid eggs on the needles of *Cedrus libani*, on which apparently normal development proceeded for a short time, though the young larvae died soon after their appearance.

Collected Leaflets on Insect Pests of Fruit Trees.—*Minist. Agric. & Fisheries*, Sectional Vol. ii, 3rd edn., 102 pp., numerous figs. London, 1924. Price 10*d.* net.

These leaflets have been collected with a view to providing a practical help to the fruit grower in recognising, understanding and controlling the insect pests with which he is most likely to have to contend. They give particulars of the plants attacked, the nature of the damage, and descriptions and life-histories of the pests, with remedial measures.

VOGRIN (V.). **Pipa bademova (*Anthonomus ornatus* Reiche), šteto-čnac bademova cvijeta u Primorju i Dalmaciji.** [*A. ornatus*, the Almond Blossom Weevil, injurious on the Shores of Croatia and in Dalmatia.]—*Glasnik Hrv. prirodoslovno Društvo* (*Soc. Sci. Nat. Croatica*), xxxiii, pt. 2, pp. 185–193. Zagreb, December 1921. (With a Summary in German.) [Received 20th November 1924.]

A detailed account is given of the life-history of *Anthonomus ornatus*, Reiche, attacking almonds in Croatia and Dalmatia, which appears to agree largely with a similar record from Sicily [*R.A.E.*, A, xii, 343]. The larval stage is however given as lasting 60 days, and the adults are recorded as resting under the bark from October to December.

The only natural enemy observed was the tit, *Parus major*, which picks the larvae out of the buds, but never attacks an uninfested one. The measures recommended are shaking the adults from the trees before hibernation and immediately after, before oviposition, the use of rye straw round the older trees as a trap for the hibernating weevils, and the destruction of all fallen blossoms. Sticky bands, as applied for *A. pomorum*, L., are not suitable owing to climatic conditions.

JANISCH (E.). **Experimentelle Untersuchungen über die Beeinflussung der Lebensdauer und des Alterns schädlicher Insekten.** [Experimental Investigations on the Influencing of the Longevity and Ageing of injurious Insects.]—*Verh. D. Zool. Ges.*, xxix, pp. 95–98. Berlin, August 1924.

An amplified form of this article on the effect of carbon dioxide in producing an artificial ageing in *Ephestia kühniella* has already been noticed [*R.A.E.*, A., xii, 483].

Sitowski (L.). **Strzygonia choinówka** (*Panolis flammea* **Schiff.**) **i jej pasorzyty na ziemiach polskich. Cześc II.** [*P. flammea* and its Parasites in Poland. Part II.]—*Roczników Nauk Rolniczych*, xii, reprint, 18 pp., 1 pl., 5 figs. Posen, 1924. (With a Summary in German.)

Further observations have been made on the biology of *Panolis flammea*, Schiff. [*R.A.E.*, A, xi, 454]. Numerous parasites have been reared, one of the more important of the Tachinids being *Winthemia amoena*, Meig., the biology and the anatomy of which are described. Of the Ichneumonids, *Meteorus scutellator*, Nees, is the most important species. Hyperparasites include *Hemipenthes morio*, L., a parasite of *W. amoena* and *Sturmia bimaculata*, Hart.; *Anthrax maurus*, L., a parasite of *Enicospilus ramidulus*, L.; and the Ichneumonids, *Phygadeuon variabilis*, Grav., *P. dumetorum*, Grav., *Hemiteles albomarginatus*, Bridgm., and *Plesiophthalmus alarius*, Grav., parasitic on *Ernestia rudis*, Fall., *W. amoena*, and *Banchus femoralis*, Thoms.

P. flammea was also found to be infested with *Empusa aulicae* and polyhedral disease. Other parasites of it recorded include *Cryptus dianae*, Grav., *Campoplex adjunctus*, Först., *Pimpla instigator*, F., *Ophion luteus*, L., *O. ventricosus*, Grav., *Henicospilus merdarius*, Grav., *Barytarbes flavoscutellatus*, Thoms., and *Meniscus murinus*, Gr. About 2 per cent. of the eggs of *P. flammea* were parasitised by *Trichogramma evanescens*, Westw. The part played in the destruction of *P. flammea* by the ants, *Formica rufa* var. *pratensis*, Retz., and the Aphids, *Lachnus nudus*, DeG., and *L. pini*, Kalt., the sweet secretions of which serve as food for the ants and for parasitic Hymenoptera and Diptera, has now been established, as wherever the ants occur the trees are free from *P. flammea*.

The author considers that natural control factors will prevent the injury caused by this moth from continuing after the present year.

Wenzel (G.). **Ein Beitrag zu dem Massenauftreten der Forleule in Niederschlesien.** [On the Outbreak of *Panolis flammea*, Schiff., in Lower Silesia.]—*Ent. Zeitschr.*, xxxviii, no. 24–25, pp. 50–51. Frankfort o.M., 19th November 1924.

Brief notes are given on the severe outbreak of *Panolis flammea* (*griseovariegata*) in Lower Silesia during 1924. In certain localities the larvae after defoliating pine trees attacked neighbouring birches, but they could not be reared on birch in captivity. Trenching was the only successful remedial measure tried.

v. Lengerken (H.). **Coleoptera II.**—*Biol. Tiere Deutschlands*, Teil 40, pp. 37–104, 44 figs. Berlin, Borntraeger, 30th November 1924. [Price, to subscribers, 2 gold marks; separate parts, 4 g.m.]

This is the second part of the section on Coleoptera of a treatise on the biology of the fauna of Germany [*R.A.E.*, A., xii, 339].

Laubert (R.). **Die wichtigsten Krankheiten und Schädlinge der Zierpflanzen im Gewächshaus und Freien.** [The most important Diseases and Pests of Ornamental Plants in Greenhouses and out of Doors.]—8vo, 130 pp., 83 figs. Berlin, Paul Parey, 1924. Price 3 gold marks.

The first part of this book is arranged under the plants concerned, with particulars of the symptoms and the causal agents. The

second part deals with diseases and pests that are confined to a given plant or plant group.

KIEFFER (J. J.). **Description de deux nouveaux genres et de trois nouvelles espèces de Cécidomyies.**—*Broteria*, Sér. Zool., xxi, no. 2, pp. 87–91. Caminha, 1st August 1924. [Received 15th November 1924.]

The larvae of one of the new Cecidomyiids described, *Arthrocnodax wissmanni*, are ectoparasites of a mite, *Phyllocoptes schlechtendali*, Nal., on the leaves of apple and pear in Germany.

BLATTNÝ (C.). **Rozšíření nosatcíků *Apion* na jeteli v Cechách roku 1923.** [The Distribution of *Apion* on Clover in Czecho-Slovakia.] —*Ochrana Rostlin*, iv, pt. 5, pp. 68–69. Prague, October 1924.

The local distribution during 1923 in Czecho-Slovakia is discussed of *A. apricans* feeding on the heads and *A. virens* feeding on the stems of clover.

[GORIAINOV (A. A.).] **Горяинов (А. А.). Амбарные вредители и борьба с ними.** [Store-room Pests and their Control.]—8vo, 120 pp., 48 figs. Moscow, 1924. Price 1*r.* 50*k.*

The more important insect pests of stored food, fabrics and other material are described, with details of their life-history and habits. Newstead's key [*R.A.E.*, A, ix, 10] to the genera of the Tyroglyphids infesting flour is quoted. Preventive and remedial measures are discussed at length.

The text of legislation dated 15th November 1923 for the protection and disinfection of grain stored or under transport is given in the form of an appendix.

[SHEMBEL (S. Yu.).] **Шембель (С. Ю.). Отчет о деятельности Астраханской станции защиты растений от вредителей за 1923 год. (С 1-го октября 1922 года по 1-го октября 1923 год.)** [Report (xiii) of the Astrakhan Station of Plant Protection from Pests for 1923. (From 1st October 1922 to 1st October 1923.)]—43 pp. Astrakhan [1924]. (With a Summary in German.)

Arctia (*Palparctia*) *spectabilis*, Tausch., caused considerable injury to grain crops, to which it migrated from neighbouring crucifers and other plants. This moth is a general feeder attacking wheat, barley, millet, mustard, lentils, sunflowers, cucurbits and various weeds. Spraying with arsenicals was attempted, but could not be carried out efficiently, partly owing to the mistrust of the natives and the difficulty in keeping stock away from the sprayed areas. Against *Locusta migratoria*, L., poison bait when broadcast apparently remained untouched; but better results were obtained by placing the bait in heaps. Large numbers of the locusts were destroyed by storms, which drove them into the sea. Considerable damage to meadow land was done by *Callimorpha* sp. towards the end of the summer. Both mown grass and dry hay were attacked. Experiment showed that the numbers of *Rhynchites auratus*, Scop., may be reduced by digging over the soil round the cherry trees in the autumn. Larvae taken from soil dug over in the spring did not pupate until the autumn, indicating the

possibility of a protracted life-cycle. Though flowers of sulphur proved very effective against the larvae and eggs of *Tetranychus telarius*, L., it caused injury to cucurbits, on which, however, flour paste proved satisfactory.

Various proprietary brands of insecticides are reported on. The use of wood ash as a substitute for lime in poison baits and Bordeaux mixtures proved satisfactory, the only drawback being that it is inclined to produce a slight sediment that clogs the apparatus.

Miscellaneous pests recorded during the year are: *Pieris rapae*, L., *Plutella maculipennis*, Curt., *Brevicoryne brassicae*, L., *Laphygma exigua*, Hb., *Pyrausta nubilalis*, Hb., *Opatrum sabulosum*, L., *Gryllotalpa gryllotalpa*, L., *Nygmia phaeorrhoea*, Don., *Hyponomeuta malinellus*, Z., *Cydia pomonella*, L., *Eurytoma amygdali*, Enderl., *Eriocampoides limacina*, Retz., *Biston hirtarius*, Cl., *Stephanitis pyri*, Geoffr. var. *sareptana*, Horv., and *Galeruca pomonae*, Scop.

[Yatzenko (F. I.).] **Яценко (Ф. И.). Обзор врагов сахарной свеклы Левобережной Украины за 1923 год.** [Review of Pests of Sugar-beet in Eastern Ukraine in 1923.]—**Защита Растений от Вредителей** [*Plant Protection*] i, no. 1–2, p. 25–28. Leningrad, October 1924.

The pests recorded are *Bothynoderes* (*Cleonus*) *punctiventris*, Germ., *Chaetocnema breviuscula*, Fald., *Psylliodes attenuata*, Steph., *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., *Cassida nebulosa*, L., *Opatrum sabulosum*, L., *Amphimallus solstitialis*, L., *Melolontha melolontha*, L., *M. hippocastani*, F., and *Euxoa* (*Agrotis*) *segetum*, Schiff.

[Kulagin (N. M.).] **Кулагин (Н. М.). К вопросу о борьбе с зерновым долгоносиком** (*Calandra granaria* **L.**) **в складах.** [The Control of *C. granaria* in Storehouses.]—**Защита Растений от Вредителей** [*Plant Protection*], i, no. 1–2, pp. 30–32. Leningrad, October 1924.

Calandra granaria, L., is not injurious to stored grain under conditions prevailing in South Russia during the winter, as where the temperature in the storehouses is below 8° R. [50° F.] the weevils hibernate in cracks in the wall or any other place affording shelter. All storehouses should be thoroughly cleaned and all cracks and crevices repaired. Proper ventilation is also an important factor in the control of this pest, as it requires a certain amount of moisture for optimum development, and cannot withstand less than 11 per cent. humidity.

[Zorin (P. V.).] **Зорин (П. В.). Биология капустной огневки.** [The Biology of *Phlyctaenia forficalis*, L.]—**Защита Растений от Вредителей** [*Plant Protection*], i, no. 1–2, pp. 41–47, 5 figs. Leningrad, October 1924.

Phlyctaenia (*Pionea*) *forficalis*, L., has usually only one generation a year in Northern Russia, though a very warm summer may produce a partial second one, and larvae may be found from July right up to the frosts. The winter is passed in the larval stage in the pupal chamber. Pupation occurs about the beginning of June, the adults emerging towards the middle of that month. The eggs may be found

on many plants including cabbage, cauliflower, beet, turnip, radish, horse-radish, etc. They are generally placed in groups on the lower surface of the leaves nearest the ground, particularly along the edge of the field. Incubation depends on the temperature, varying from 6 days at a temperature of 27–30° C. [80·6–86° F.] to 23 days at 10–12° C. [50–53·6° F.]. The larvae begin feeding at once on the lower surface of the leaves. When full-grown (after from 35 to 40 days), they enter the soil for pupation. The subsequent development depends on the temperature. If reared at low temperatures (12–15° C. [53·6–59° F.]) and kept in similar or even warmer conditions after constructing the pupal chamber they do not pupate for about 3 months. In nature such larvae do not pupate until the following summer.

The parasite, *Apanteles gabrielis*, Gautier & Riel, was reared during these observations as well as a Chalcid egg parasite.

[Redikortzev (V.).] **Редикорцев (В.). О мучных клещах.** [On Flour Mites.]—**Защита Растений от Вредителей** [*Plant Protection*], i, no. 1–2, pp. 47–48. Leningrad, October 1924.

Heavy infestations of flour, grain and seed in storage by the Tyroglyphids, *Glyciphagus spinipes*, Koch, and *Tyroglyphus* (*Aleurobius*) *farinae*, DeG., are reported from various parts of Russia. This is apparently the first Russian record of *G. spinipes*. Another mite, *Cheyletus eruditus*, Latr., predacious on both species, was also generally present.

[Reichardt (A.).] **Р[ейхардт] (А.). Сосновая совка** (*Panolis piniperda*) **в Вятской губ.** [*P. flammea* in the Viatka Government.]—**Защита Растений от Вредителей** [*Plant Protection*], i, no. 1–2, p. 49. Leningrad, October 1924.

A serious outbreak of *Panolis flammea*, Schiff. (*piniperda*, Panz.) is recorded from Russia, the infestation covering over 200 acres, about 50 of which have the appearance of a dead forest, as the needles of the pine trees over this area were completely destroyed. The majority of the larvae were killed before pupation by the fungus, *Empusa aulicae*.

[Reichardt (A.).] **Р[ейхардт] (А.). Точильщик,** *Anobium striatum*, **L.—Защита Растений от Вредителей** [*Plant Protection*], i, no. 1–2, p. 50. Leningrad, October 1924.

Anobium striatum, L., is recorded in unusual abundance from the northern districts of Russia, where it is causing serious injury to furniture. Good results were obtained with carbon bisulphide.

Susainathan (P.). **The Fruit Moth Problem in the Northern Circars.**—*Agric. Jl. India*, xix, pt. 4, pp. 402–404. Calcutta, July 1924.

Observations made during 1923 and the previous years show that the falling of fruits of pomegranates, oranges and sweet limes in the Kistna District is due to the Noctuids, *Ophideres materna*, L., *O. fullonica*, L., and *Anua coronata*, F. [*cf. R.A.E.*, A, xii, 378]. During 1923 a campaign was instituted against the food-plants of the larvae.

O. materna breeds on *Tinospora cordifolia* and *O. fullonica* on *Cocculus hirsutus*, both of the family Menispermaceae, and *A. coronata* on *Combretum ovalifolium*, of the family Combretaceae. The destruction of these weeds was begun on the 24th June, and in less than 3 weeks most of them had been cleared from around the villages. Wherever this method has been adopted, its value in protecting the orchards has been distinctly demonstrated.

Malloch (J. R.). **A New Aphidiphagous Fly from Coimbatore.**—*Mem. Dept. Agric. India*, Ent. Ser., viii, no. 7, pp. 67–68. Calcutta, August 1924.

Leucopis (*Neoleucopis*) *luteicornis*, sp. n., is described from Coimbatore, where it is parasitic on *Phenacoccus iceryoides*, Green (rain-tree mealybug).

Friederichs (K.). **Bionomische gegevens omtrent den Koffiebessenboeboek.** [Bionomic Data on the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 11, pp. 261–286. Malang, September 1924. (With a Summary in English.)

Observations in the field and under experimental conditions show that when a large number of individuals of the coffee berry borer, *Stephanoderes hampei*, Ferr., have only a few ripe berries at their disposal—a condition obtaining in districts where the coffee harvest is not spread over the whole year—overcrowding hinders propagation, so that less offspring results. If the overpopulation is excessive, the beetles entirely destroy their breeding-places without forming any brood, because they use the contents of the berries for their own nourishment.

The development of the borer at Malang at about 1,400 feet above sea-level averaged 25 days in the dry season, the same time as found by Leefmans at Buitenzorg at about 800 feet in the wet. Tests were also made to ascertain the duration of development at high altitudes, up to about 3,600 feet. Within 33 days of the infestation of the berry many more individuals emerged at 1,400 feet than at 2,800, and again many more at 2,800 than at 3,600. In 2 of 3 tests made at 3,600 feet 33 days were not sufficient for a single individual to reach the adult stage. The altitude limit of the borer in Java is not known, but fairly severe attacks have been noted at 3,600 feet. According to den Doop, in Uganda—where the climate at a given elevation is warmer—the range extends to about 5,300 feet. In an estate in Sumatra the high-lying plots were less attacked than the low-lying ones in 1921–1923, but in 1924 the difference was less noticeable.

Only the females leave the berries (in which they have developed) and take wing, most of them after having mated within the berries, while of the remainder, those that enter an already infested berry are likely to be fertilised. In the experiments 31–32 days elapsed between the boring by the mother beetle and the exit of its progeny. If one day is allowed between boring and oviposition and an average of 25 days for development, this leaves 5–6 for the adult to darken in colour and to mate. The minimum total duration of one generation is 25–26 days, made up of 19 days for development, 5 days for colouring and mating and 1–2 days for boring and oviposition. The average total duration of one generation can be worked out approximately

in cases where oviposition occurs immediately after boring into a berry with hard seed lobes. Oviposition extends over an average period of 40½ days, and if half of this (20) is added to the 31–32 elapsing between boring and emergence of the first adult females, the figure of 51–52 days is obtained. The young female often delays a long time, however, within the berry before ovipositing.

In 22 experiments the female adults lived 55 days and laid 56 eggs on an average. The respective maxima were 91 days and 79 eggs. The survivors of females that were prevented for 1 or 2 months from ovipositing (by being kept in the pulp of berries from which the beans had been removed) lived for 67 days and laid 37 eggs on an average, the respective maxima being 115 days and 70 eggs. One that was kept for 2 months without an opportunity for oviposition lived for 119 days and laid 46 eggs. Prevention of reproduction thus prolongs the life of the borer. This has an important bearing on the value of "rampassen" (completely stripping the bushes of all berries above 4 mm. in diameter).

It was found experimentally that young beetles can develop for a period of about 3½ months in infested red berries unless the berries rot prematurely owing to an excess of moisture.

Schweizer (J.). **Over het verschil in vatbaarheid voor boeboekaantasting bij koffie.** [On the Differences in the Susceptibility of Coffee to Attack by the Coffee Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 11, pp. 287–314. Malang, September 1924.

There is insufficient evidence at present to demonstrate different degrees of susceptibility in varieties of coffee to attack by the coffee berry borer [*Stephanoderes hampei*], and further experiments are needed. A variety that ripens its berries quickly is less likely to favour the development and increase of the beetle. Differences occur in individual bushes, but at present it is not possible to say if this is due to local conditions. It is possible that coffee plants resistant to the borer may be obtained by hybridisation. *Coffea schumanniana* in an infested plot has hitherto proved free from attack.

Friederichs (K.). **In hoever bestaan er verschillen in de vatbaarheid der koffiesoorten voor den Koffiebessenboeboek?** [To what Degree do Differences exist in the Susceptibility of Varieties of Coffee to the Coffee Berry Borer?]—*Meded. Koffiebessenboeboek-Fonds*, no. 11, pp. 315–358. Malang, September 1924. (With a Summary in English.)

Among other investigations on this subject the author endeavoured to find if there was a difference in the increase of the coffee berry borer [*Stephanoderes hampei*] in estates planted with one variety only of coffee. Experimentally the average number of beetles in all stages per berry after one generation was as follows: Quillou 22·5, Robusta 24·5, Excelsa, 7·8, Abeokuta, 5·6. Thus in Quillou 4 times the amount of brood as in Abeokuta was formed from an original infestation of equal intensity. After 2 generations the proportion would therefore be 16 : 1.

In all the varieties examined the berries that were attacked were smaller on the average than those not attacked. The reason is unknown.

The differences in the behaviour of the borer to different varieties should be more pronounced in estates where only one variety is grown, as otherwise a variety with a high brood-figure will influence the infection in another with a low brood-figure.

The low brood-figures in coffees of the Liberica type give in themselves no reason to suppose that the crop from these varieties suffers less from attack. For in these varieties the crop is being harvested throughout the year, and thus the borer increases regularly. In the case of Robusta, there is, almost throughout Java, a period entirely without ripe berries, so that the natural increase of the pest is interrupted. On the other hand, Liberica has fewer and larger berries, so that remedial measures are simpler. In Sumatra, where Robusta is harvested all the year round, the author has advised the planting of Liberica as a trial. He has gained the impression that Arabica coffee in the lower hill-country (where it is now rarely met with) has a great attraction for the borer. But it grows best on the very high estates and is thus less exposed to attack, as the climate there seems less favourable to the pest.

Though Quillou is not in general more subject to attack than Robusta, Quillou trees among Robusta always form centres of infestation. Excelsa and Abeokuta are less susceptible than Robusta in a district where there is no marked dry season.

Circulaires, welke op den Koffiebessenboeboek betrekking hebben. [Circulars that refer to the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 11, pp. 359–367. Malang, September 1924.

In circular no. 7 of 5th January 1924 the Malang Experiment Station emphasises the need for clearing the bushes and the ground of all black coffee berries remaining after harvest.

Circular no. 2 of the Coffee Berry-borer Fund, dated 4th March 1924, announces the successful importation into Java of a borer parasite from Uganda, while others from the Besoeki and Malang Stations, dated June and July 1924 respectively, record that the Director of Agriculture has given permission for the release of the parasite. In its circular no. 13 of 7th August 1924 the Besoeki Station warns planters not to relax the measures now being taken against the borer, because the Uganda parasite cannot in any case become effective in the current year. It is important that sorting of the coffee berries should be done in the factory and not in the plantation ; coffee berries should be disinfected with boiling water or should be kept under water until pulped, as this hinders the emergence of the adults.

Kalshoven (L. G. E.). **Aanteekeningen over enkele kina-insecten.** [Notes on a few Pests of Cinchona.]—*Meded. Inst. Plantenziekten*, no. 65, 27 pp., 4 pls. Buitenzorg, 1924. (With a Summary in English.)

Injury to cinchona shoots, first noticed in 1920 in a plantation adjoining a mixed primeval forest, was found to be due to the larvae of a weevil then new to science, *Alcides cinchonae*, Mshl., which occurs in Java, Sumatra and the Straits. Its habits resemble those of *A. leeuweni*, Hllr., attacking the silk-cotton tree, *Eriodendron anfractuosum*. The larval mines in cinchona are, however, so far as observed, rather short, only up to 4 inches. The burrowing causes small swellings

on the shoots, but the latter continue to grow. The young tops of the shoots are killed, showing wounds apparently made by the adult weevils when feeding on the tender tissue. As the killing of the leading shoots has a very unfavourable effect on the growth of the trees, a repeated attack would be very troublesome, but no such injury has been recorded hitherto. The measures advocated are the collection of the adults, and the removal and destruction of infested shoots, combined, perhaps, with the corrective pruning of the trees.

A striking mortality among cinchona on one estate was thought to be due to shot-hole borers, found in healthy trees as well as in sickly ones. In material received for examination the three species represented were *Xyleborus semigranosus*, Bldf., *X. andrewsi*, Bldf., and another species, perhaps *X. sordicauda*, Motch. *X. semigranosus* and *X. andrewsi* are shot-hole borers of secondary habits, usually infesting unhealthy trees. Some records are given of their attack on various plants in Java. The typical galleries of *X. andrewsi*, found in another food-plant (*Kopsia flavida*), are described.

Some further observations have been made on the ring borer, *Phassus damor*, Moore, of which the biology is still incompletely known, and to the geographical range of which Borneo and N.E. and W. Sumatra must be added. The caterpillar appears to have nocturnal habits. In the Preanger district the moths apparently appear from August to December (end of the dry monsoon and beginning of the rains); medium-sized caterpillars were found in May, and full-grown ones in July and August. In East Java, however, the moths appeared in February, and one was bred as late as March at Buitenzorg. In one case 39 days and in another 58 elapsed between the spinning of the small web at the entrance of the burrow just before pupation, and the appearance of the moth. Numerous new records of food-plants of this moth are given. No parasites were found. Teak is planted extensively in Java, but though it is infested in West Java where there are no important plantations, hitherto only one instance has been observed in the central and eastern parts of the island.

Killing the larvae *in situ* by means of a pointed wire is impracticable on account of the course of the mines, and the measures suggested are hilling of the base of the tree, an abundant application of tar to the ring-gallery and entrance of the interior burrows, and the injection of a suitable insecticide followed by sealing.

SILVESTRI (F.). **A New Myrmecophilous Genus of Coccidae (Hemiptera) from India.**—*Rec. Indian Mus.*, xxvi, pt. 4, pp. 311–315, 5 figs. Calcutta, June 1924. [Received 27th November 1924.]

Xenococcus annandalei, gen. et sp.n., is described from Madras, where it was found in the nests of an ant, *Acropyga acutiventris*, Rog., on rootlets of various trees of the genus *Ficus*. So long as the soil is damp and warm both the ants and the Coccids remain under stones just below the surface, but in cold dry weather they go deeper into the ground.

LESNE (P.). **Les Coléoptères Bostrychides de l'Afrique tropicale française.**—*Encyclopédie entomologique*, iii, 301 pp., 1 pl., 172 figs., 38 maps. Paris, Lechevalier, 1924. Price *Frs.* 45.

In this monograph of the Bostrychids of French tropical Africa, the author extends the scope of this family to include the Lyctids,

which have previously been placed in the Clavicornia. The distribution and food-plants of the species dealt with are given wherever possible, and some indications regarding the best methods of control of the more important ones are included. Keys are given to the genera and species of the principal groups. Besides a general index, there are special ones to the scientific and popular names of the Bostrychids dealt with, to their enemies and associates and to the plants and vegetable products cited.

Bezzi (M.). **Further Notes on the Ethiopian Fruit-flies, with Keys to all the known Genera and Species.**—*Bull. Ent. Res.*, xv, pts. 1 & 2, pp. 73–118 & 121–155. London, August & November 1924.

These two instalments complete the author's series of papers on the Ethiopian fruit-flies [*cf. R.A.E.* A, viii, 263, etc.].

In order to offer a complete synopsis of all the species at present known from the Ethiopian region (numbering about 390), the new forms received from all sources are incorporated, full descriptions of them being prepared for later papers.

Keys are given to all the subfamilies and genera and to the species of the following genera : *Tridacus*, Bezzi ; *Dacus*, F. (s.str.) ; *Conradtina*, Endl. ; *Celidodacus*, Hendel ; *Carpophthoromyia*, Aust. ; *Leucotaeniella*, Bezzi ; *Ceratitis*, McLeay ; *Pterandrus*, Bezzi ; *Pardalaspis*, Bezzi ; *Perilampsis*, Bezzi ; *Trirhithrum*, Bezzi ; *Themarictera*, Hendel ; *Themara*, Wlk. ; *Baryglossa*, Bezzi ; *Ptiloniola*, Hendel ; *Rhacochlaena*, Loew ; *Taomyia*, Bezzi ; *Phorellia*, R.-D. ; *Afrocneros*, gen.n. ; *Ocnerioxa*, Speis. ; *Coelotrypes*, Bezzi ; *Hermannloewia*, Bezzi ; *Urophora*, R.-D. ; *Craspedoxantha*, Bezzi ; *Terellia*, R.-D. ; *Aciura*, R.-D. ; *Spheniscomyia*, Bezzi ; *Tephrella*, Bezzi ; *Afreutreta*, Bezzi ; *Euaresta*, Loew ; *Pliomelaena*, Bezzi ; *Spathulina*, Rond. ; *Sphenella*, R.-D. ; *Ensina*, R.-D. ; *Euribia*, Meig. ; *Camaromyia*, Hendel ; *Acanthiophilus*, Becker ; *Trypanea*, Schr. ; *Eutretosoma*, Hendel ; *Rhabdochaeta*, de Meij., and *Rhochmopterum*, Speiser.

Descriptions are given of 61 new species and 4 new varieties, and 6 new genera are erected.

Staniland (L. N.). **The Immunity of Apple Stocks from Attacks of Woolly Aphis (*Eriosoma lanigerum*, Hausmann). Part ii. The Causes of the Relative Resistance of the Stocks.**—*Bull. Ent. Res.*, xv, pt. 2, pp. 157–170, 18 figs. London, November 1924.

An earlier part of this paper [*R.A.E.*, A, xi, 537] dealt with the relative resistance of the apple stocks experimented with ; in the present part the causes of resistance are explained. The following is the author's summary :—

A short account of gall formation is given.

The stylets of *Eriosoma lanigerum* penetrate to within three or four cells of the cambium. Penetration is mainly intracellular, but the stylets cannot pass through the masses of sclerenchyma. When a mass of sclerenchyma is encountered the stylets bend round it ; if they cannot bend round it, they are usually withdrawn. So far as can be seen at present, immunity cannot be explained by mechanical considerations. There is strong evidence for supposing that resistance above ground is directly proportional to the percentage of sclerenchyma

round the circumference of the stem. The above statement must be qualified, if necessary, by a consideration of the extent to which the masses of sclerenchyma are broken up, *i.e.*, the number of spaces that are available for the penetration of the stylets. The middle lamella can be dissolved by the saliva of the Aphid, so that the check formed by a mass of sclerenchyma can eventually be overcome. Variations in the character of the sclerenchyma and its position are shown to be of possible importance. There would also seem to be some connection between the size of the Aphid and the size of the openings between the masses of sclerenchyma.

The relations of the stylets and stylet track to the cells of the stock are briefly summarised. Measurements have been made of the stylets of *Eriosoma lanigerum*, *Aphis rumicis* and *A. pomi*; also of the length of stylets available for insertion into the tissues of the stock. All three species of Aphids were found feeding on the stocks at Chelsea. The stylets of *E. lanigerum* and *A. rumicis* were found to be long enough to reach a point suitable for the formation of galls. This would point to a difference in the constitution of the saliva of these two species. *A. pomi* has an insufficient length of stylets to penetrate much beyond the middle of the cortex.

The melting point of the wax secreted by the Aphids has been shown to be above the boiling-point of water. Starch can be converted into sugar by feeding the Aphids on a plate of glycerine jelly impregnated with it.

WITHYCOMBE (C. L.). **Factors influencing the Control of Cotton-stainers (*Dysdercus* spp.).**—*Bull. Ent. Res.*, xv, pt. 2, p. 171. London, November 1924.

Most of the information in this paper has been noticed from another source [*R. A. E.*, A, xii, 548]. In discussing the presence of typical and non-typical forms of *Dysdercus howardi*, mention is made of the fact that the migrants, composed largely of small dark forms, feed and lay eggs in the ground among the cotton crop, and the generations resulting from them are typical, pale and generally fairly large.

POMEROY (A. W. J.). **Further Observations on *Dysdercus superstitiosus*, F., and other Insects affecting Cotton in Southern Nigeria.**—*Bull. Ent. Res.*, xv, pt. 2, pp. 173–176, 4 pls. London, November 1924.

A résumé is given of continued experiments [*R. A. E.*, A, xii, 67] with regard to damage by *Dysdercus* spp. to the cotton crop (American variety) grown in the Southern Provinces, Nigeria. A table shows the results of placing adults of *D. superstitiosus* on young bolls, the buds having been screened before they showed signs of opening. It is evident from the results that the stainer is capable of causing shedding of the bolls by the mechanical action of puncturing them, or that boll disease may be introduced, while the cotton is in the flowering stage. Unless the carpel wall is pierced, however, no injury to the boll results either from the insect, or, in all probability, from the disease. Internal proliferation does not take place unless the carpel wall is pierced, and is not an essential factor in the shedding of young bolls, but rather indicates injury from an external source. Puncturing by stainers of the buds and flowers, before the flower petals have fallen off, may cause the shedding of the boll and the introduction of the disease.

Punctured bolls can be detected within half an hour of the act by the presence of a small bead of moisture exuding from the orifice. Experiments lasting over two years have proved that cotton bolls that are screened and kept free from insect attack do not develop the symptoms of internal boll disease or the condition typical of stainer or bollworm injury. These insects are therefore the principal cause of damage. Experiments were undertaken to determine the effect of combined injury by *Dysdercus* spp. and the larvae of Lepidoptera, such as *Prodenia litura*. In most cases typical injury by both was produced and also boll disease, but in a case where the stainer died without puncturing the boll and the larva of *P. litura* died without piercing the carpel wall, the boll developed normally with no stained lint or internal proliferation. Aphids were occasionally present, but they do not pierce the carpel wall, while in the case of attack by the bollworms, *Earias* spp. and *Diparopsis castanea*, the boll is invariably bored through and the interior destroyed.

TEMPANY (H.). **Annual Report of the Department of Agriculture for the Year 1923.**—23 pp. Port Louis, Mauritius, 1924.

Solenopsis geminata (red ant) causes considerable injury to live plants, and no definite and practical remedial measures for it have yet been found. *Scolia oryctophaga*, the parasite of *Oryctes tarandus*, originally imported from Madagascar, has been found in large numbers in certain localities where it had been liberated in 1917.

ABOT (G.). **Note sur le Doryphore** (*Leptinotarsa decemlineata*, **Say**).—*Bull. Soc. Etudes scientif. d' Angers*, liii (1923), pp. 67–68. Angers, 1924.

A short account is given of *Leptinotarsa decemlineata*, Say (Colorado potato beetle), and of its appearance in France. As yet, it has not appeared in Anjou, and it is hoped that its invasion of the south will remain restricted.

STEIN (P.). **Die verbreitetsten Tachiniden Mitteleuropas nach ihren Gattungen und Arten.** [The most widely distributed Tachinids of Central Europe according to their Genera and Species.]—*Arch. Natg.*, Abt. A, no. 6, pp. 1–271. Berlin, November 1924.

In this revision of the Tachinids most generally distributed throughout Central Europe, nine new genera and nineteen new species are described. Keys to the various genera and species are included.

HERING (M.). **Minenstudien IV.** [Studies on Leaf Mines IV.]—*Zeitschr. Morphol. u. Oekologie der Tiere*, ii, no. 1–2, pp. 217–250, 16 figs. Berlin, 20th October 1924.

This paper deals with the insects of various orders obtained in 1923 by breeding them from leaf-mines. A number of new species are described, but not from plants of economic importance.

SPEYER (W.). **Die Kirschblütenmotte,** *Argyresthia ephippiella* **F.** (= *pruniella* **L.**). [The Cherry Blossom Moth, *A. ephippiella*, F.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, iv, no. 12, pp. 89–91, 6 figs. Berlin, 1st December 1924.

In some districts of Germany, Russia, England and Scandinavia the cherry crop is considerably reduced, sometimes by as much as 50 per cent., by the cherry blossom moth, *Argyresthia ephippiella*, F., which, however, often escapes notice owing to its small size and concealed habits. The author had completed a preliminary study of this pest when Lundblad's work [*R. A. E.*, A, xii, 108] became known to him. The results of the two investigations agree to a very large extent.

At Naumburg the moths occur from the end of May to mid-August, but this long flight-period does not imply 2 generations, as the first mature eggs were not found in the ovaries of the moths until the second half of July. Females placed in cages on 24th July 1924 lived and oviposited for nearly a month. Mating and oviposition appear to occur at night. The eggs may be found from mid-July onwards singly in minute cracks of the bark, in old leaf-scars, in badly-closed buds, and similar rough places on the branches. No eggs have been taken from the rough bark of the trunks. The caterpillars hatch in the following spring, enter the buds and begin feeding. It is very probable that one larva can destroy several buds. Early in May the larva lowers itself by a thread to the ground, where it pupates at the surface under débris.

Attempts to kill the adults by poison-baits proved a failure, and light-traps are useless. Sprays with good wetting properties should be able to reach the eggs. The best remedies, therefore, seem to be spraying with 10 per cent. carbolineum or 5 per cent. oil emulsion before the buds begin swelling, this treatment to be repeated a few days later ; and digging up the ground beneath the trees and stamping it down after mixing in some quicklime in order to destroy the pupae.

TILLYARD (R. J.). **The Parasite of the Woolly Aphis in New Zealand. Progress of the Work of Distributing** *Aphelinus mali* **during the Season 1923-24.**—*N.Z. Fruitgrower & Apiarist*, reprint, 7 pp. Auckland, N.Z., 16th September 1924.

The work in connection with the distribution of *Aphelinus mali*, Hald., the parasite of the woolly aphis [*Eriosoma lanigerum*, Hausm.] in New Zealand [*R. A. E.*, A, xii, 70] has been continued most satisfactorily ; details of the various localities to which the parasites have been sent are given. The strain of the parasite that is being propagated in New Zealand is exceptionally vigorous and was obtained by crossing examples obtained from 3 widely separated parts of the United States. It has been successfully introduced into South Africa from New Zealand, and consignments are now to be shipped to the Transvaal, where previous introductions of a less vigorous strain failed to survive.

The New Zealand strain has also become established in Australia.

BROADFOOT (H.). **Control of Codlin Moth.**—*Agric. Gaz. N.S.W.*, xxxv, pt. 10, pp. 755–757. Sydney, 1st October 1924.

The apple and pear crop of 1923-24 was much below the general average in New South Wales, and as a low crop is generally followed

by a heavy one, attention is drawn to the importance of thorough and efficient control of the codling moth [*Cydia pomonella*], the various points of this work requiring special care being discussed.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxii, pt. 4, pp. 273–275. Brisbane, October 1924.

Further experiments have definitely proved that calcium cyanide, even in much larger doses than would be required for the control of cane grubs, does not injure the sugar-cane plants. The fumigant is considered well worthy of study as a possible factor in the control of the grey-back cockchafer [*Lepidoderma albohirtum*].

Termites have been particularly injurious in some districts; soil fumigation with paradichlorobenzene to protect the newly planted cane seems likely to yield good results. In the laboratory, workers, nymphs and soldiers of *Termes meridionalis* proved more susceptible to the fumigant than larvae and soldiers of *Mastotermes darwiniensis*. Dipping the sets in arsenical solutions has also been tried. All termites were dead after 4 days in the cages where the sets had been dipped in solutions of 1 or 2 lb. of lead arsenate to 24 gals. of water. Sugar-cane planted in May and July appears to be much attacked, and on low-lying alluvial flats the termites damaged both young and old plants. Though carbon bisulphide killed a large number of termites, its effect is of such short duration that the stools become reinfested.

The large moth borer [*Phragmatiphila truncata*] was abundant in young shoots of ratoon and plant cane. Various other insects of minor importance were also observed.

DORMER (W. C.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxii, pt. 4, pp. 275–277. Brisbane, October 1924.

The larvae of the grey-back cockchafer [*Lepidoderma albohirtum*] have caused serious damage locally; in all the cases the soil should prove suitable for fumigation with paradichlorobenzene. In some districts the most serious sugar-cane pests are an Anoplognathid and *Pentodon australis* (black set beetle), both species boring holes in freshly planted sets and destroying roots, eyes and shoots. The damage is most serious where the first crop of sugar-cane is planted on land previously under *Paspalum* grass, on the roots of which both beetles and grubs live. There is no reason why these pests should not be controlled by fumigation with carbon bisulphide.

HAMLIN (J. C.). **New Cactus Bugs of the Genus** *Chelinidea* **(Hemiptera).**—*Proc. R. Soc. Queensland 1923*, xxxv, pp. 43–45. Brisbane, 29th February 1924. [Received 4th December 1924.]

Insects collected in North America for introduction into Australia against the prickly-pear included *Chelinidea hunteri*, sp.n., from Mexico, *C. canyona*, sp.n., from Texas, and *C. vittigera* var. *texana*, n., from Texas and Mexico. All these bugs feed on prickly-pear.

FULLAWAY (D. T.). **Insect Collecting in Panama.**—*Hawaiian Forester & Agriculturist*, xxi, no. 3, pp. 94–98. Honolulu, July-September 1924.

A search for parasites of the pineapple mealybug [*Pseudococcus brevipes*, Ckll.] was made in Panama, where 7 species were found:

4 Coccinellids (2 probably the same as those introduced from Mexico into Hawaii), 2 species of Diptera and one Hymenopterous parasite, an Encyrtid of the genus *Chrysoplatycerus*, distinct from either of those imported from Mexico. The last named was also found infesting *P. virgatus* on the aerial roots of different wild figs in Panama. These natural enemies were eventually successfully shipped to Hawaii.

EHRHORN (E. M.). **Reports of the Chief Plant Inspector, May-August 1924.**—*Hawaiian Forester & Agriculturist*, xxi, no. 3, pp. 120-130. Honolulu, July-September 1924.

The following pests were intercepted in Hawaii during May to August 1924: From China, *Bruchus chinensis* in beans, and *Pheidole javana* in green ginger; from Japan, *Prenolepis* sp. in chestnuts, *Lepidosaphes ficus* on sandpears, and *Bruchus pisorum* in peas and beans; from the Orient, *Lepidosaphes gloveri*, *Parlatoria pergandei* and *Pseudaonidia trilobitiformis*, all on oranges; from New Zealand, *Icerya purchasi* on *Acacia baileyana*, a mealybug on *Eucharis amazonica*, and *Trionymus phormii* on *Phormium tenax rubrum*; from Java, a Tenebrionid in a package of coffee; from Pennsylvania, *Trionymus lounsburyi* on *Amaryllis* bulbs; from Illinois, *Pseudococcus maritimus* on lily bulbs; from California, *Pseudococcus* sp. on geraniums, *P. maritimus* on pears, larvae of codling moth [*Cydia pomonella*] in pears, *Carpophilus* sp. in decayed pears, and woolly aphis [*Eriosoma lanigerum*] on apples; from France, *Bruchus obtectus* in beans.

PERKINS (R. C. L.) & SWEZEY (O. H.). **The Introduction into Hawaii of Insects that attack Lantana.**—*Bull. Expt. Sta. Hawaiian Sugar Planter's Assoc.*, Ent. Ser., Bull. 16, 83 pp., 7 figs., 1 pl. Honolulu, September 1924.

The introduction of noxious plants and insects in general is discussed with special reference to the introduction of the weed *Lantana camara* into Hawaii and its subsequent control by means of introduced insect enemies [*cf. R.A.E.*, A, iii, 757]. The letters exchanged between R. C. L. Perkins and A. Koebele in connection with the introduction of beneficial insects are quoted, and a list is given of insects observed in connection with lantana in Mexico. A report by Koebele on the enemies of lantana in Mexico and their introduction into the Hawaiian islands is here published for the first time; it was probably written in 1903 just after the close of the work in Mexico in 1902. In this report the insects dealt with are grouped according to the part of the plant attacked. The most beneficial are those that prevent seed production. Of the 23 species originally introduced, only 8 have become established in or near Honolulu, whence they have rapidly spread to most of the islands of the group. Notes are given on the life-history and habits of these 8 species [*loc. cit.*], of which the Agromyzid is now listed as *Agromyza lantanae*, Frogg., whilst the gall-fly erroneously recorded as *Eutreta sparsa*, Wied., has since been described by Aldrich as *E. xanthochaeta*. The lantana plants have been greatly reduced by these insects, aided by climatic and probably other conditions. This reduction is greater in the dry than in the wet regions. Where the plants have been cleared for grazing or agricultural purposes they do not as a rule reappear, but if the land

is allowed to revert again to natural growth, other shrubs and trees become established, many of which are more difficult to eradicate than lantana.

Algunos insectos que atacan a las plantaciones de tabaco y medios de combatirlos. [Some Insects that attack Tobacco Plantations and the Means for combating them.]—*Minist. Agric. de la Nación*, Circ. 330, 4 pp. Buenos Aires, 18th October 1924.

The chief pests of tobacco in Argentina are cutworms and the tobacco horn-worm [*Protoparce* sp.]. Against the cutworms collection and a poison-bait containing Paris green are the measures advised. The Sphingid is best dealt with by spraying or dusting with lead arsenate.

Bondar (G.). *Phthorimaea operculella* **Zell., no Brasil.** [*P. operculella* in Brazil.]—*Correio-Agric.*, ii, no. 10, pp. 292–294, 2 figs. Bahia, October 1924.

Up to May 1924 the potato tuber moth, *Phthorimaea operculella*, Zell., was unknown in Brazil, though it had been intercepted in imported potatoes [*R. A. E.*, A, xi, 442], but since then the author has found it on tobacco.

Silveira Mello (O.). **Inimigos dos cannaviaes,** *Tomaspis liturata*. [Pests of Cane-fields. *T. liturata*.]—*Correio-Agric.*, ii, no. 10, pp. 294–295. Bahia, October 1924.

The Cercopid, *Tomaspis liturata*, is a serious pest of sugar-cane, particularly in neglected fields, in the State of Rio de Janeiro. Conflicting reports as to the amount of injury caused are due to its being accompanied by *T. indicata*, a comparatively harmless species.

Cleare (L. D.), Jr. **A Note on the Control of the Coconut Caterpillar.**—*Jl. Bd. Agric. British Guiana*, xvii, no. 3, pp. 159–162. Georgetown, July 1924. [Received 27th November 1924.]

A brief account is given of the life-history of *Brassolis sophorae*, L. (coconut caterpillar) in British Guiana, where its ravages are greatly reduced by the activities of parasites. Those already mentioned [*R. A. E.*, A, xi, 291] attack the pupae, whilst *Anastatus reduvii*, How., and *Telenomus nigrocoxalis*, Ashm., parasitise the eggs. Another parasite, as yet undetermined, has been found to attack the larvae. It is suggested that in carrying out the usual remedial measures, clean cultivation and collection of all stages of the butterfly, the latter should not be destroyed, but kept for the emergence of possible parasites. The best method for handling these collections is discussed.

Barreto (B. T.). **Algo sobre la estirpación del Mosaico.** [Some Notes on the Eradication of Sugar-cane Mosaic.]—*Agricultura*, ii, no. 1, pp. 8–9. Santiago de las Vegas, October 1924.

One of the recommendations is that the cane-fields should be weeded and cleaned up after the diseased cane-stocks have been uprooted.

If weeding is done sooner, the vector of the disease, *Aphis maidis*, will abandon the withering grasses for the canes, and a great spread of the infection will result.

GOWDEY (C. C.). **The Sweet Potato Weevil** (*Cylas formicarius* (**F.**) **var.** *elegantulus*, **Summ.**).—*Dept. Agric. Jamaica*, Ent. Circ. 11, 5 pp. Kingston, 1924.

This is a general account of the life-history and habits of *Cylas formicarius*, F. (sweet potato weevil), and of the measures in use against it [*R. A. E.*, A, vii, 21 ; x, 281, 309, etc.]. The form found in Jamaica is *C. formicarius* var. *elegantulus*, Summ.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric Dept. St. Vincent 1923*, pp. 23–29. Trinidad, 1924.

In December 1923, *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) was discovered in St. Vincent, and was subsequently found in all the islands known as the St. Vincent Grenadines. The control of the pest in these islands will be very difficult, owing to the fact that two types of cotton (Sea Island and Marie Galante) are generally grown ; the harvesting of the first begins about August, and by the time this is about over, the second variety is just coming into bearing. It has been the practice to bring quantities of Marie Galante cotton into St. Vincent to be ginned, but this is now taken to the adjacent island of Carriacou after being fumigated at Union Island. The indications are that it would be economically sound to grow only one type of cotton in the Grenadines, and as Marie Galante is the hardier of the two, this variety should be selected. Experiments were conducted to determine to what depth carbon bisulphide would penetrate cotton seed meal and deal effectively with the pink bollworm. Under the conditions of the experiment, the fumigation was effective against the adult moths at a depth of 12 in., against larvae at 8 in., and against pupae and eggs at 6 in. A second fumigation would probably be advisable after an interval of from 7 to 10 days, as by that time transformation would have occurred of any eggs and pupae not killed by the first fumigation. Cotton seed meal could therefore be effectively fumigated in bags with a diameter of 12 inches. In the case of cotton seed, the effective range of the fumigant might be greater, as the material is not so closely packed. There are no indications in these experiments that *P. gossypiella* can breed or maintain itself in cotton seed meal.

Alabama argillacea (cotton worm) severely infested cotton in the southern part of the island towards the end of the year, in spite of the many parasitic enemies that are usually present in the island. Unremitting work against *Dysdercus delaunayi* (cotton stainer) has given most encouraging results. The organisation of the campaign is described.

Red ring of coconuts, caused by the Nematode, *Aphelenchus cocophilus*, was found on several estates. The only remedy is complete destruction of the diseased palms by fire, preferably by the charcoal pit method. Affected areas should be protected by trenches. Infestation seems most generally to occur in trees in the fourth to sixth year after planting.

Among minor pests, *Eriophyes gossypii* (leaf blister mite) damaged Sea Island cotton to the extent of rendering necessary a close season

in the Grenadines for this type of cotton ; *Nezara viridula*, generally fairly numerous in fields of weeds, was sometimes rather abundant in cotton fields, but little damage was done ; the Coccids, *Saissetia nigra* and *Hemichionaspis minor* appeared on cotton, but too late to do much damage ; the cotton aphis [*Aphis gossypii*] was also present on cotton, and *Tetranychus telarius* (red spider) on sweet potatoes. *Diatraea saccharalis* and *Metamasius* (*Sphenophorus*) *sericeus* occurred on sugar-cane. Coconuts were attacked by *Rhynchophorus palmarum*, *Aleurodicus cocois* and *Aspidiotus destructor*. *Cosmopolites sordidus* (black weevil borer) was found occasionally on bananas, *Aspidiotus harti* on yams, and *Fundella* (*Ballovia*) *cistipennis* damaging the pods of pigeon peas [*Cajanus indicus*].

Dampf (A.). **Estudio morfológico del gusano del maguey** (*Acentrocneme hesperiaris* **Wlk.**) **(Lepidoptera, Megathymidae).** [A morphological Study of the Agave Caterpillar, *A. hesperiaris*.]—*Rev. Mexicana de Biologia*, iv, 1924, reprint, 15 pp., 10 figs. [Mexico, 1924.]

Acentrocneme hesperiaris, Wlk., is very common in central Mexico where *Agave* is cultivated. The eggs are laid in October and November, and the larvae hatch from December to February and immediately begin attacking the leaves. They are full grown about May and are then carefully collected for sale in Mexico City, being regarded as a great delicacy by all classes.

Cook (W. C.). **Climatic Variations and Moth Flight at Bozeman.**—*Canad. Ent.*, lvi, no. 10, pp. 229–234. Orillia, Ont., October 1924.

Data are recorded regarding captures of Noctuids at light traps in south-western Montana in 1919 and again in 1923. The tables show that in general the prairie forms are decreasing, the mountain forms are holding their own, and the eastern and Pacific intruders are increasing.

The author's general conclusion is as follows : The insect fauna of a given region is not a single stable unit, varying only in abundance from year to year, but is a composite of smaller groups, each of which has a more or less definite optimum. The composition of the fauna in a given season is very definitely related to the climatic conditions prevailing at the time of growth. Three dry years culminating in 1919 enormously increased the proportion of prairie elements in the Bozeman fauna, while reducing the eastern and mountain forms. The trend of the climate towards normal has resulted by 1923 in a great reduction in these prairie intruders and the re-establishment of the eastern and mountain forms. How much farther this movement will go cannot be predicted, but it is certain that a return of dry weather will reverse the direction of the trend.

Swaine (J. M.). **Four new Species of** *Carphoborus* **(Ipidae, Coleoptera).**—*Canad. Ent.*, lvi, no. 10, pp. 234–236. Orillia, Ont., October 1924.

The new species described are *Carphoborus blaisdelli*, from California ; *C. dunni*, from New Brunswick, on red spruce [*Picea rubra*] ; *C. sansoni*, from Alberta, on white spruce [*P. canadensis*] ; and *C. ponderosae*, from British Columbia on *Pinus ponderosa*.

Davidson (W. M.). U.S. Bur. Ent. **Observations and Experiments on the Dispersion of the Convergent Lady-beetle** (*Hippodamia convergens*, **Guérin**) **in California.**—*Trans. Amer. Ent. Soc.*, l, no. 3, pp. 163–175, 3 figs. Philadelphia, September 1924.

In order to test the value of the importations of *Hippodamia convergens*, Guér., from the Sierra Nevada into Imperial Valley, a number of marked beetles were liberated. Only a small fraction of the marked individuals were subsequently recovered, and these were found at distances varying from $\frac{1}{2}$ to $4\frac{3}{4}$ miles from the point of liberation. After the twelfth day no beetles were recovered, the majority having been taken within 7 days. The observations revealed the fact that when these beetles are transported to lower altitudes and released under a higher temperature in the daytime they fly off immediately and distribute themselves over large areas. When released at night, they migrate similarly on the following day. This migratory habit prevents the satisfactory employment of the beetles in restricted areas.

Entomology and Parasitology.—*Univ. Cal., Rept. Coll. Agric. & Agric. Expt. Sta., 1922–23*, pp. 120–135, 10 figs. Berkeley, Cal., 1923. [Received 14th November 1924.]

Most of the entomological work of 1922–23 in California recorded in this report has already been noticed from various sources. Among the pests dealt with, *Scutigerella immaculata*, Newp. (garden centipede) was seriously injurious to asparagus [*R. A. E.*, A, xii, 578]. *Agromyza simplex*, Lw. (asparagus miner) was found to be a more widely distributed and more injurious fly than had been supposed, the maggots mining in great numbers just beneath the epidermis of the stalk in the soil, and pupating at the end of their galleries.

A study of the natural enemies of *Eutettix tenella* (beet leafhopper) has shown many to be present in California. Predators include the bugs, *Neides muticus*, Say, *Zelus socius*, Uhl., *Geocoris pallens*, Stål, and *Nabis kalmii*, Reut.; various spiders; *Iridomyrmex humilis*, Mayr (Argentine ant); *Chrysopa californica*, Coq. (green lacewing); and a mite. Parasites bred from the eggs are *Polynema eutettixi*, Gir., *Anagrus giraulti*, Crawf., *Aphelinoides plutella*, Gir., and *Anthemiella rex*, Gir. They were reared more abundantly from eggs laid in saltbushes (*Atriplex*) than in sugar-beets. Other parasites have been previously recorded [*R. A. E.*, A, iii, 557].

Porter (B. A.) & Alden (C. H.). **The Cankerworms.**—*U.S. Dept. Agric.*, Dept. Bull. 1238, 37 pp., 3 pls., 2 figs. Washington, D.C., 15th October 1924.

There are two species of cankerworms present in the United States, *Alsophila pometaria*, Harr. (fall cankerworm) and *Palaeacrita vernata*, Peck (spring cankerworm). Both occur in the south-eastern States and in southern Canada as far west as Manitoba, and have been found in California. *A. pometaria* has also been recorded from Colorado, and the main range of *P. vernata* extends as far west as that State and as far south as Texas. Elm and apple are the preferred food-plants, though many common deciduous fruit, forest and ornamental trees are also attacked and are practically defoliated during a severe infestation if it is neglected. There is one generation a year in the case of each species. The stages and seasonal history are described [*cf.*

R.A.E., A, vi, 546]. The eggs of both moths hatch in the spring when apple blossoms are showing pink, and the larval feeding periods of both coincide to some extent. Life-history studies in Connecticut during 1920 and 1921 showed that the eggs of *A. pometaria* hatch early in May, the relation between the stage of development of apple buds and hatching of the cankerworms being practically the same each year. Hatching is largely limited to 4 or 5 days, though it may last over 12 days. All the larvae under observation entered the ground for pupation at the close of the 4th instar, after a feeding period of about 32 days. The cocoon is placed several inches below the ground surface and is generally complete in 24 hours, after which there is a prepupal period lasting about 31 or 32 days, while the pupal period occupies another 27 to 35 days in a normal season. The moths may begin to emerge at any time in the autumn, but do not usually leave the ground in numbers until after the first frosts, generally in the latter half of November. In very cold weather egg-laying may be delayed for a number of days, but is generally completed within a few days, the moths depositing the eggs almost anywhere, though they prefer the smaller twigs. Emergence of a few of these moths is generally delayed until the early spring.

The adults of *P. vernata* emerge in early spring, soon after the frost is out of the ground, and the larval feeding period occupies about 30 days; these larvae generally prefer to feed on the twigs, whereas those of the autumn species are frequently found on a green shoot or in the curl of a leaf. Pupation occurs at a depth of several inches, no cocoon being spun; there is a prepupal period lasting 6 or 7 days.

Besides a number of parasites previously dealt with [*R.A.E.*, A, x, 190], others recorded include *Telenomus gnophaelae*, Ashm., recorded by Girault as parasitic on the eggs of *A. pometaria*, though the identity of this species has been questioned; *Meteorus hyphantriae*, Riley, cocoons of which were found in trays containing nearly full-grown larvae of both species of cankerworms; and *Apanteles palaeacritae*, Riley, a parasite of *P. vernata*, which is said not to kill the host larva before its emergence, though it dies shortly afterwards. *Sarcophaga cimbicis*, Towns., and *S. latisterna*, Parker, were reared from *A. pometaria*, as well as a species of *Rhogas*, which was found parasitising third-instar larvae, though it seems to be frequently attacked by a hyperparasite, *Hemiteles sessilis*, Prov. In addition to these parasites, there are a number of predators, as well as other natural factors, such as unfavourable weather, diseases, starvation and bird enemies, that all tend to keep the cankerworms in check. Ploughing in summer and autumn will help to control the spring form. Both species are readily killed by the use of 1 lb. powdered lead arsenate to 50 U.S. gals. water in the pink spray, with a second application soon after the blossoms have fallen. Where spraying is impracticable, sticky bands to catch the wingless females have given good results; these should be in place by mid-October for the autumn species and should be kept in good order until the ground is thoroughly frozen for the winter. If infestation is severe, they should be renewed as soon as the ground thaws in early spring in order to catch any adults that have delayed emergence, and should be maintained until the apple blossoms have fallen. For the spring species the barriers should be in place with the first thawing of the ground in February or March and should remain effective until the apple blossoms have fallen. Methods of preparing suitable material and of attaching the bands are described.

Howard (N. F.) & English (L. L.). **Studies of the Mexican Bean Beetle in the Southeast.**—*U.S. Dept. Agric.*, Dept. Bull 1243, 50 pp., 16 figs. Washington, D.C., August 1924. [Received 17th November 1924.]

An account is given of *Epilachna corrupta*, Muls. (Mexican bean beetle) as occurring in the south-eastern United States, and of the natural factors operating against it, as well as the remedial measures practised for its control [*R. A. E.*, A, ix, 374 ; x, 121 ; xii, 165, 167, etc.].

Phillips (W. J.) & Fox (H.). **The Rough-headed Corn Stalk-beetle.**—*U.S. Dept. Agric.*, Dept. Bull. 1267, 33 pp., 4 pls., 16 figs. Washington, D.C., 14th October 1924.

This is a general account of *Ligyrus* (*Euetheola*) *rugiceps*, Lec. (rough-headed corn stalk beetle), which has already been noticed from a preliminary record [*R. A. E.*, A, vi, 484]. The distribution and life-history are given in detail, with descriptions of the stages. While best known as a pest of maize and sugar-cane, the insect is believed to feed normally on certain grasses of the genus *Paspalum*, particularly *P. laeve* and *P. plenipilum*, the large, coarse-stemmed forms apparently not being suitable. It also feeds on the common rush (*Juncus effusus*) and Bermuda grass [*Cynodon dactylon*]. Maize is attacked only in the spring when it is young ; the chief danger to larger maize plants is in the weakening of the stalks, which may be blown over or broken by strong wind. The adult stage in the latitude of Virginia apparently lasts from 9 to 11 months ; experiments indicate that under exceptional conditions it may last from 12 to 14 months. Certain species likely to be mistaken for *L. rugiceps* are discussed. There are several possible predators of it, such as Carabid beetles, but in the present studies the enemies most frequently found were mites that attach themselves to the body surface ; these have been identified as the hypopus stage of *Rhizoglyphus phylloxerae*, Riley, which are said to be saprophytes, feeding on decaying vegetable matter. The presence of these mites seems to have a decidedly injurious effect upon the larvae and pupae, although the adults are apparently little affected by them. Possibly the fluctuations in the numbers of the mites from year to year may be one of the factors in determining the rather sporadic and irregular manner in which destructive outbreaks of *L. rugiceps* occur. There are also two species of true parasites, a Dexiid, *Megapariopsis opaca*, Coq., the larva of which lives within the body of the larval host until it is ready for pupation, when it bores its way out, and a Hymenopteron, which was not reared to the adult stage, but which closely resembles *Tiphia inornata*, Say. All stages of *L. rugiceps*, especially the larva and pupa, are subject to infection by a fungus, *Metarrhizium anisopliae*. The remedies suggested are those previously noticed [*loc. cit.*].

Porter (B. A.). **The Bud Moth.**—*U.S. Dept. Agric.*, Dept. Bull. 1273, 20 pp., 2 pls., 1 fig. Washington, D.C., 14th October 1924.

An account is given of the life-history and habits of *Eucosma* (*Spilonota*) *ocellana*, F. (bud moth) [*R. A. E.*, A, iii, 258], which is a serious pest of apple orchards in the northern United States and Canada. A list of its food-plants in Europe and North America is

given, and a number of other bud-moths that have similar habits and are sometimes confused with it are briefly described. Several parasites of *E. ocellana* are listed, including a species of *Secodella*, which is probably new. The sprays recommended are 1 lb. dry lead arsenate added to the pink cluster-bud application and the usual calyx spray for codling moth [*Cydia pomonella*, L.]. In very severe infestations, an arsenical should also be applied about midway between the bursting of the buds and the time when the blossom buds show pink. As an additional precaution (seldom required) an arsenical application in August, coating the lower surface of the leaves, is sometimes given.

Snodgrass (R. E.). U.S. Bur. Ent. **The Tent Caterpillar.**—*Ann. Rept. Smithsonian Instn. 1922* (Pubn. 2737), pp. 329–362, 1 pl., 21 figs. Washington, D.C., 1924.

This is a popular account of the life-history of *Malacosoma americana* (tent caterpillar) in the United States. A detailed account of the structure and physiology of the larva is also given.

Fenton (F. A.). **The Apple Maggot and its Control.**—*Trans. Iowa State Hortic. Soc.*, pp. 56–63, 4 pls., 1 fig., 1 map. [Des Moines, ? 1924.]

Injury to many varieties of apple by *Rhagoletis pomonella*, Walsh (apple maggot) has been increasing recently in Iowa. The life-history and remedial measures as worked out in other States are described. Experiments in poisoning the adult flies by means of lead arsenate sprays in Iowa, though only extending over one season, gave promising results, suggesting that one or two sprays applied late in July and early in August would protect the most susceptible varieties of apple. These sprays also considerably reduced the injury done by apple fruit miners.

Injurious Insects and other Pests.—*Rept. Kansas Agric. Expt. Sta., July 1922–June 1924*, pp. 76–87. Manhattan, Kans., 1924.

Studies on the pea aphis [*Acyrthosiphon pisi*] with regard to climatic conditions have shown that at temperatures slightly below their optimum (55–65° F.) these Aphids live longer, reproduce more rapidly and produce more young on lucerne than on peas, while at temperatures slightly above the optimum (80–90° F.) they are more successful on garden peas than on lucerne. They could not be maintained on lucerne at high temperatures. If this proves to be constantly true, the behaviour of this insect in lucerne fields is readily explained. It generally spends the winter in Manhattan on lucerne in the form of wingless agamic females, which in the spring reproduce even at low temperatures, becoming seriously abundant somewhat before their predators become active. After infesting lucerne from March to May, the Aphids gradually become winged and scatter; during July and August they may be absent on lucerne but are present on peas, while during September they return to lucerne again. The behaviour of this insect is largely influenced, if not controlled, by weather conditions, the study of which is to be continued. Calcium cyanide flakes, using 100 lb. to the acre, gave complete control of *A. pisi*; the lucerne was badly scorched but soon recovered. Both 2·7 and 4 per cent. nicotine dust, at the rate of 50 and 30 lb. per acre respectively, gave fair results.

Investigations were also made regarding the wilt disease, which is very important in controlling *Colias* (*Eurymus*) *eurydice* (alfalfa caterpillar). Humidity proved to be of greater influence than temperature, high temperatures and low humidity being less favourable than high humidity and low temperatures. The disease is less prevalent in the drier parts of the country, but after a series of heavy rains it may appear suddenly and practically eliminate the butterfly.

A severe outbreak of *Loxostege similalis* (garden webworm) occurred on lucerne in July and August 1923. This insect appears first on weeds (chiefly *Amarantus* spp.). The best remedy was to cut down lucerne as soon as it began to show injury, leaving a strip around the field, and then to spray it and the weeds along the fence row with a driving spray of lead arsenate. Poison bran mash was absolutely ineffective.

Studies of the Hessian fly [*Mayetiola destructor*] indicate that in case of severe drought, as in the autumn of 1922, the pupal stage is considerably prolonged. The fly is now present in 87 counties in Kansas, infestation being severest in the north-west quarter of the State. At Manhattan it was found that wheat planted before 1st October was severely injured in the experimental plots, while a study of the infestation in north-west Kansas indicated that the fly-free date is earlier than previously given. Tests with regard to resistance of different varieties of wheat to attack are recorded in a table; the absence of the fly on varieties of barley and rye and some of the soft wheats suggests the possibility that there are physiological strains of the fly.

Some promising results were obtained by the use of calcium cyanide against chinch bugs [*Blissus leucopterus*] in wheat. In cases of attack by this bug on maize, absence of chlorophyll rendered the plants much more susceptible to injury, so that the lignin content in the stalks may be one factor affecting infestation. The increasing area devoted to Sudan grass [*Sorghum sudanense*] is a source of danger, as the bugs hibernate in numbers in the stubble. Some information is given regarding the best date for planting different varieties of maize in order to avoid injury by corn earworm [*Heliothis obsoleta*]. The resistance of different varieties was found to vary greatly, and a study has been made of the various plant characters of the maize that might influence injury. In many cases the length of the husk over the ear had a marked influence on injury, and it was found that ears bearing a few tassel spikes at the top were particularly resistant.

The effect of feeding insects infesting stored grain on various types of food has shown that nutrition has a marked influence on the development of the insect, some foods prolonging the life-cycle from 2 to 3 years, while others accelerate growth, reducing the normal life-cycle.

On melons and watermelons, Aphids and cucumber beetles [*Diabrotica*] were satisfactorily controlled with a proprietary nicotine-sulphate dust; calcium cyanide dust was less effective and much more injurious to the plants and is not recommended for use on melons.

Farming under Boll Weevil Conditions.—*North Carolina State Dept. Agric.*, Extens. Circ. 124, 21 pp., 2 pls. Raleigh, N.C., January 1923. [Received 20th November 1924.]

This collection of papers is intended to cover the problem of farming under conditions of infestation with the boll weevil [*Anthonomus grandis*, Boh.]. Only three of them deal with the strictly entomological aspect.

A general account is given by F. Sherman of the boll weevil in North Carolina. For the earliest weevils appearing, constant hand-picking is recommended in small fields, or a light dust application of calcium arsenate before the cotton squares form. As infested squares are easily seen, it is easier to gather and burn them than to search for the insect, but this must be done every week or ten days at least. Clean farming in general will expose many weevils during the winter and ensure their destruction. Cotton should not be grown within a mile or so of woods or ditch-banks or other shelter for weevils.

B. R. Coad describes the method of poisoning the weevils with calcium arsenate dust [*cf. R.A.E.*, A, viii, 457, etc.] and discusses its cost and suitable machinery.

C. B. Williams discusses suitable soils for cotton-growing under boll weevil conditions, their preparation and cultivation, the best varieties of cotton, the rate of planting and spacing, fertilisation, etc.

Leiby (R. W.) & Clapp (S. C.). **Dusting of Cabbage and Collards to control Worms.**—*North Carolina State Dept. Agric.*, Extens. Circ. 135, 8 pp., 3 figs. Raleigh, N.C., January 1923. [Received 20th November 1924.]

Cabbages in the western parts of North Carolina are considerably damaged by the larvae of Lepidoptera, the worst pests being *Phytometra* (*Autographa*) *brassicae*, Riley (cabbage looper) and *Pieris* (*Pontia*) *rapae*, L. (imported cabbage worm). The remedy recommended, as a result of tests lasting from 1917 to 1920, is the application of 1 lb. dry powdered lead arsenate to 6 lb. dry powdered air-slaked lime. The time and manner of application of this dust are discussed.

Sherman (F.) & Mabee (W. B.). **Dust-poison Method for Control of Boll Weevil.**—*North Carolina State Dept. Agric.*, Extens. Circ. 137, 22 pp., 4 figs. Raleigh, N.C., July 1923. [Received 20th November 1924.]

The results secured in controlling the boll weevil [*Anthonomus grandis*, Boh.] with calcium arsenate dust are recorded for the southern counties of North Carolina in 1922. It is considered, judging from results both in North Carolina and in Louisiana, that the saving due to this method may be regarded as an average of 300 lb. of seed cotton per acre.

Cotton (R. T.). U.S. Bur. Ent. **A Contribution towards the Classification of the Weevil Larvae of the Subfamily Calendrinae, occurring in North America.**—*Proc. U.S. Nat. Mus.*, lxvi, art. 5, no. 2542, pp. 1–11, 10 pls. Washington, D.C., 1924.

The subfamily, Calandrinae (Calendrinae), is represented in North America by 11 genera and about 90 species, of which more than two-thirds belong to the genus *Sphenophorus* (*Calendra*). The classification presented by the author deals only with the generic characters, and is based on a study of the larvae of all the genera found in North America with the exception of *Trichischius*, the larva of which is unknown, and *Eucactophagus*, of which the species listed for North America are introduced ones, not known to be established

in that country. In the key to the genera, Leng's catalogue has been followed in the use of generic names, except that his *Calendra* is replaced by *Sitophilus*, and his *Sphenophorus* by *Calendra*.

GERHARD (W. J.). **The Periodical Cicada.**—*Field Mus. Nat. Hist.*, Dept. Zool., Leaflet no. 4, 14 pp., 1 pl., 9 figs., 2 maps. Chicago, Ill., 1924.

In North America the immature stages of *Tibicen* (*Tibicina*) *septemdecim*, L., extend over 17 years, or 13 years only in the south. On hatching the larvae enter the soil near some rootlet, upon the sap of which they presumably feed. They usually burrow to a depth of 6 to 24 inches, though they have been recorded as deep as four feet or more below the surface. They grow slowly and shed their skins at intervals of several years. After the fourth moult, when the larvae (of the northern race) are about 12 years old, they change into the first of the two nymphal stages, which are quite active, and continue to feed upon the root juices. In the spring of the seventeenth year, the nymphs come to the exterior during May and June and climb up any convenient object, the adults emerging at night. These feed upon the sap of trees in the twigs of which the female lays her eggs, numbering from two to six hundred. Many different trees and shrubs, and sometimes herbaceous plants, are used for oviposition, though oak seems to be preferred and pine trees to be exempt.

This insect often does much harm to fruit-trees, and frequently causes the death of young ones from the results of the egg-punctures. There is no conclusive evidence that the immature insects do much injury to trees or plants while feeding on the sap of the small roots; they may, however, be destroyed by injecting carbon bisulphide into the ground. When the adults emerge near orchards or nurseries, young fruit-trees should be protected by netting, and the insects found resting on it collected and killed every morning and evening. In limited areas the adults may be readily killed by spraying them with a strong kerosene emulsion, which will also even kill the nymphs.

THATCHER (R. W.). **Forty-Second and Forty-Third Annual Reports for the fiscal Years ended June 30, 1923 and 1924.**—*N. Y. Agric. Expt. Sta.*, 50 and 56 pp. Geneva, N.Y., 1924.

These reports include a brief summary of the entomological work carried out during the years under review, much of which has been dealt with at greater length in the various bulletins, circulars and other articles published by the Station.

PARROTT (P. J.) & HARMAN (S. W.). **Comparative Efficiency of Dust and Spray Mixtures in controlling the Currant Aphis.**—*N. Y. Agric. Expt. Sta.*, Bull. 517, 21 pp., 4 pls. Geneva, N.Y., July 1924.

Experiments for the control of *Myzus ribis*, L., on currants have been continued for several years. The mixtures used depended on nicotine as the killing agent. This was derived from superfine tobacco dusts, containing 1 and 3·5 per cent. nicotine respectively, or nicotine sulphate (40 per cent. nicotine). Dust mixtures were applied with a power dusting machine, approximately at the rate of 1 lb. per bush,

and sprays with a power spraying outfit, at an average rate of about 2 U.S. gals. per bush. One application was made after the Aphids had hatched from the winter eggs, usually when the more advanced leaves had a diameter of one-half to one inch, with subsequent applications whenever the Aphids appeared to be developing in destructive numbers. It was generally found necessary to make a second application after blossoming, and in some cases a third when the berries turned red. The best results were obtained with soap and nicotine sprays at standard strength and sulphur lead arsenate dusts containing 1 and 2 per cent. nicotine. The spray formula recommended is 1 U.S. pt. nicotine sulphate, 5 lb. soap and 100 U.S. gals. water. For the preparation of home-made dusts containing nicotine sulphate, hydrated lime or superfine dusting sulphur should be used as the carrier. The sulphur will also control leaf spot, but though generally safe, it caused injury to foliage in some cases. Dusting should be done so far as possible on still days when temperatures are high and there is as little moisture as possible on the foliage. To facilitate the application of both dusts and sprays, it is advisable to prune the bushes carefully during early spring, removing straggling and excess canes. The treatment can no doubt be combined with the regular treatment for various diseases of the currant, but is not of any economic value in very light infestations, particularly when they are restricted to the foliage at the tips of the canes.

PATCH (E. M.). **The Buckthorn Aphid** (*Aphis abbreviata* **Patch**).—*Maine Agric. Expt. Sta.*, Bull. 317, pp. 29–52, 8 figs. Orono, Me., April 1924. [Received 27th November 1924.]

The buckthorn Aphid is of world-wide distribution and occurs on many cultivated and wild plants, those on which it has been found in Maine being listed. It has undoubtedly been described from some of these food-plants as a distinct species, and has been much confused with the melon aphis (*Aphis gossypii*, Glov.) in entomological collections and literature. For the present, until the synonymy has been cleared up, the name *A. abbreviata*, Patch, has been adopted. The various stages are described. The winter is passed in the egg stage on the branches of buckthorn (*Rhamnus*), usually near the leaf buds. The stem-mothers hatch in the spring, and their progeny feed like the parents on the leaves of buckthorn. The second spring generation includes both winged and wingless forms, the winged individuals migrating to nasturtium (*Tropaeolum*), dock, potatoes, cucumbers, squashes, and many other plants, from which subsequent generations disperse still further. The progeny of the wingless individuals of the second spring generation also becomes winged and migrates to the various summer food-plants. The summer generations are mostly wingless, but late in the summer and in the autumn both winged and wingless individuals are again produced; the former (autumn migrants) return to buckthorn and produce the egg-laying females, whilst the latter produce winged males, which migrate to buckthorn.

This Aphid appears to be of considerable importance as a vegetable pest and thrives best during the summer in shaded or moist situations, as a result of which its habits and behaviour vary on different plants. It has also been proved capable of transmitting mosaic in potatoes according to some observers.

In many cases the destruction of the winter food-plant (buckthorn) will prove the best method of control ; where this is impracticable, the majority of the oviparous females may be killed by spraying in the autumn, under Maine conditions the last week in September, followed by a second spray two weeks later. Another spray in the spring should kill most of the Aphids before they migrate to the summer food-plants (before the middle of June in Maine). For spraying kerosene emulsion or nicotine sulphate is recommended, or a nicotine dust may be used. Fumigation should be even more effective.

SPENCER (H.), ZIMMERLEY (H. H.) & DAVIS (R. J.). **Dusting and Spraying Eggplants.**— *Virginia Truck Expt. Sta.*, Bull. 47, pp. 331–347, 1 fig. Norfolk, Va., 1st April 1924. [Received 27th November 1924.]

The production of egg-plants for early market is of considerable importance in Eastern Virginia. The insect pests of this crop are the flea-beetles, *Epitrix parvula*, F., and *E. cucumeris*, Harr., which puncture the leaves, stunt the plants and cause the first flowers to drop ; the Aphids, *Myzus persicae*, Sulz., and *Macrosiphum solanifolii*, Ashm., which were particularly injurious in hotbeds in 1923, but were controlled by dusting with 3 per cent. nicotine dust, after which the sashes were closed tightly ; *Tetranychus* spp., usually only of importance during long periods of dry weather, which were successfully controlled by dusting with equal parts of lime and sulphur at the rate of 45 lb. per acre ; and *Gargaphia solani*, Heid. (egg-plant lace-bug), which is only injurious when the plants (which should be destroyed as soon as the fruit is harvested) are left in the field much longer than usual.

During 1918 to 1923, experiments were made with a view to determining the best spray or dust to be used for the production of the best crop, aiming chiefly at the destruction of flea-beetles and fungous diseases. The following is from the authors' summary of the results : Of the sprays used, Bordeaux, composed of copper sulphate 4 lb., hydrated lime 8 lb., water 50 U.S. gals., to which was added 2 lb. calcium arsenate, consistently gave excellent results. The same amount of lead arsenate in place of the calcium arsenate was slightly inferior. Zinc arsenite, with Bordeaux, compared very favourably with Bordeaux and calcium arsenate sprays ; in several instances the best yields were obtained with the former combination. Bordeaux-soap sprays were ineffective. Bordeaux without arsenicals cannot be recommended, the increase in yield obtained by its use being negligible. On the other hand, sprays of calcium arsenate, 2 lb. to 50 U.S. gals. water, gave large increases in the yield compared with no treatment.

Dusts can be highly recommended for the control of flea-beetles. In 1922 and 1923 the yields from plots treated with Bordeaux dust composed of monohydrated copper sulphate 16 per cent., calcium arsenate 20 per cent., and hydrated lime 64 per cent., were distinctly superior to the yields from plants on adjacent plots sprayed on the same dates with Bordeaux and calcium arsenate spray (4–8–2–50). A similar Bordeaux dust, without the arsenical, was distinctly inferior. Arsenical dusts were of considerable benefit, but combinations of them with Bordeaux are better.

The sprays should be applied with traction or power outfits capable of maintaining pressures of 125 lb. Three nozzles per row are necessary for thorough covering of foliage and fruit. The top nozzle should point downwards over the plant, and the side nozzles, near the ground, should point inward and upward to cover the undersides of the leaves. Hand dusting machines have, however, given satisfaction and are largely replacing power or traction dusters for this crop. Spraying or dusting should be started in the plant bed. During the period when the plants are growing rapidly, weekly applications are suggested. Near the end of the harvest or in dry weather the intervals between treatments may be lengthened, but at all times the foliage and fruits should be well covered, as the materials are essentially repellent.

Davis (R. J.), Spencer (H.) & Zimmerley (H. H.). **Dusting and Spraying Tomatoes.**—*Virginia Truck Expt. Sta.*, Bull. 46, pp. 317–327, 3 figs. Norfolk, Va., 1st January 1924. [Received 27th November 1924.]

Heliothis (*Chloridea*) *obsoleta*, Hb., is the principal insect pest affecting early tomatos in Virginia [*cf. R. A. E.*, A, x, 30]. Of dusts and sprays tried with a view to producing the best yield in this crop in both 1922 and 1923 the best results were obtained with dusting. Spraying, however, is recommended where its use avoids the necessity of procuring a fresh outfit. The dust used contained 16 per cent. monohydrated copper sulphate, 64 per cent. finely screened hydrated lime, and 20 per cent. calcium arsenate. For spraying in 1922 a Bordeaux mixture was used, composed of 4 lb. copper sulphate, 6 lb. quicklime, and sufficient water to make 50 U.S. gals. Two lb. of powdered calcium arsenate were added to each 50 U.S. gals. In 1923 a similar spray was used substituting 8 lb. of hydrated lime for the 6 lb. of quicklime. Treatment should be started in the seed-bed and continued at intervals of from 7 to 10 days in the field as soon as the plants are well established.

The applications must be more frequent in rainy than in dry, sunny weather. In rainy weather they should be made at least once a week, using 20 lb. of dust or 75 U.S. gals. of spray per acre when the plants are small and double this amount when they are large. Except in cases of severe infestation, when the treatment should be continued throughout the harvest period, applications may be made less frequently as the season advances. On late autumn crops of tomatos, frequent applications are not advisable, as they retard the ripening of the fruit.

Barber (G. W.). U.S. Bur. Ent. **Notes on** *Piesma cinerea* **Say.**—*Psyche*, xxxi, no. 5, pp. 229–232, 2 figs. Boston, Mass., October 1924.

The bug, *Piesma cinerea*, Say, was abundant in certain sections of Massachusetts during 1922, all stages being found in the field during July, August and September. Various species of *Amarantus* were attacked in varying degrees. The eggs are laid on the lower surface of the leaves near the veins. The nymphs feed on the lower surface of the leaves, which curl and thus afford them shelter. The immature stages are described.

Weiss (H. B.) & Lott (R. B.). **Notes on *Piesma cinerea* Say in New Jersey (Hemiptera).**—*Psyche*, xxxi, no. 5, pp. 233–235. Boston, Mass., October 1924.

Piesma cinerea, Say, occurs throughout New Jersey, being common locally. It has been found feeding on the flower heads of rush (*Scirpus atrovirens*) and *Amarantus retroflexus*, a common weed in cultivated orchards and fields. It has previously been recorded on horsechestnut, etc., and as a pest of grape vine. The original description of the adult is quoted.

McBride (O. C.). **Injurious Insect Pests of Strawberries.**—*Missouri Agric. Expt. Sta.*, Bull. 215, 11 pp., 6 figs. Columbia, Mo., June 1924. [Received 4th December 1924.]

The more injurious strawberry pests in Missouri include : *Tyloderma fragariae*, Riley (strawberry crown-borer), *Lachnosterna* spp. (white grubs), *Ancylis comptana*, Fro. (strawberry leafroller), *Empria maculata*, Nort., and *E. ignota*, Nort. (strawberry sawflies), *Aphis forbesi*, Weed (strawberry root-aphis), *Anthonomus signatus*, Say (strawberry weevil), *Haltica ignita*, Ill. (strawberry flea-beetle), *Coremelanes pulicaria*, Germ. (negro bug), *Lygus pratensis*, L. (tarnished plant bug), *Harpalus* spp. (ground beetles), and Gryllids.

A spray schedule for *T. fragariae* and the leaf-eating insects is given. Where fungous diseases are also important, a combined spray of Bordeaux mixture and lead arsenate (2 lb. powder to 50 U.S. gals.) is recommended, one application to be made just after growth begins, a second when the berries are about half-grown, and a third, if insects are unusually serious, after the crop has been gathered. These measures will also protect the plants from many minor insect pests.

Talbert (T. J.). **Spraying Missouri Fruits.**—*Missouri Agric. Expt. Sta.*, Bull. 216, 32 pp., 14 figs. Columbia, Mo., July 1924. [Received 4th December 1924.]

The author's abstract is as follows : In this bulletin the importance of timely and thorough spraying is emphasised. The essential factors to be considered in the control of fungous diseases and insect pests injurious to fruits under Missouri conditions are carefully considered. A complete spraying schedule for all the fruits commonly grown in the State is included. The standard spraying mixtures, formulae and preparation, together with a description of modern spraying equipment and accessories, are carefully set forth. The making and application of Missouri cold lubricating oil emulsions and boiled oil soap emulsions as sprays for deciduous fruit trees are given special attention.

Shotwell (R. L.). U.S. Bur. Ent. **A New Species of the Mealybugs.**—*Ann. Ent. Soc. Amer.*, xvii, no. 3, pp. 353–354, 1 fig. Columbus, Ohio, September 1924.

Trionymus hypolithus, sp.n., was taken in Colorado from the nest of an ant, *Lasius* sp., under a rock.

McDaniel (E. I.). **Greenhouse Insects.**—*Michigan Agric. Expt. Sta.*, Spec. Bull. 134, 75 pp., 41 figs. East Lansing, Mich., June 1924. [Received 6th December 1924.]

An account is given of the bionomics and control of the insect pests attacking plants in greenhouses in Michigan. The preparation and application of various insecticides and poison baits, and methods of fumigation and soil sterilisation are described. An index is given to both pests and plants attacked.

Pettit (R. H.). **White Ants (Termites).**—*Michigan Agric. Expt. Sta.*, Circ. Bull. 63, 2 pp., 2 figs. East Lansing, Mich., June 1924. [Received 6th December 1924.]

Leucotermes flavipes is becoming more and more destructive in the north-central States, considerable injury being done to dwellings and public buildings in Michigan. Wherever the tunnels of these termites can be detected, a small hole should be drilled in the wood and a quantity of kerosene injected. It is important that the fumes should reach the nests, and every effort should be made to locate them. A few ounces of pyrethrum added to each gallon of kerosene increases its action. In many cases the pest has been introduced into houses in dead wood stored for fuel, so that it is advisable to examine any dead wood brought in.

Snyder (T. E.). U.S. Bur. Ent. **A non-subterranean Termite in Virginia.**—*Proc. Ent. Soc. Washington*, xxvi, no. 8, pp. 207–209. Washington, D.C., November 1924.

A further description of the dealated adult of *Calotermes approximatus*, Snyder, is given. It has been found in Virginia in a dead standing bald cypress tree [*Taxodium distichum*] with the bark on. Colonies evidently pass the winter in the interior of the wood. As yet it does not appear to be common or to damage telephone or other poles or woodwork. The presence of this termite may be detected by the impressed pellets of excrement expelled from infested wood. It does not require so much moisture as *Reticulitermes*.

Where species of *Calotermes* are injurious, telephone poles and all wood-work should be entirely impregnated with coal-tar creosote, as insulation from the ground alone will not protect them from attack by *Calotermes*, as in the case of *Reticulitermes*.

Barnes (W.) & Benjamin (F. H.). **On the Correct Name for the Brown-tail Moth.**—*Proc. Ent. Soc. Washington*, xxvi, no. 8, p. 213. Washington, D.C., November 1924.

The authors discuss and approve the grounds on which the scientific name of the brown-tail moth has been recently changed to *Nygmia phaeorrhoea*, Don. [*R. A. E.*, A, v, 496].

Back (E. A.) & Cotton (R. T.). U.S. Bur. Ent. **Effective Use of Hydrocyanic-acid Gas in the Protection of Chick-peas** (*Cicer arietinum*) **warehoused in 240-pound Sacks.**—*Jl. Agric. Res.*, xxviii, no. 7, pp. 649–660, 1 pl., 1 fig., 3 tables. Washington, D.C., 17th May 1924. [Received 9th December 1924.]

It has been generally believed that hydrocyanic acid gas has not sufficient power of penetration to reach and kill insects hidden in tightly-packed stored foodstuffs. During 1918–1920 the authors had the opportunity of observing the effects of this material on a large scale in different warehouses. It was found that infestations of chick-peas (*Cicer arietinum*) by *Bruchus quadrimaculatus, Rhizopertha dominica, Lasioderma serricorne* and *Plodia interpunctella* could be satisfactorily controlled by fumigation with hydrocyanic acid gas throughout the bulk of 240-pound sacks whether these were stacked 4 or 5 deep, as chick-peas are ordinarily warehoused, or in piles, the tiers of which were often 18 sacks high. *Calandra (Sitophilus) oryzae* and *Sitotroga cerealella* were not satisfactorily controlled by one fumigation, though many of the insects were killed. *B. quadrimaculatus* is the chief pest of chick-peas, and is efficiently controlled with hydrocyanic acid gas, when generated from 2½ lb. of 98 to 99 per cent. pure sodium cyanide per 1,000 cu. ft. of space. This has now become the standard method in commercial establishments.

Leiby (R. W.) & Hill (C. C.). U.S. Bur. Ent. **The Polyembryonic Development of** *Platygaster vernalis.*—*Jl. Agric. Res.*, xxviii, no. 8, pp. 829–840, 8 pls. Washington, D.C., 24th May 1924. [Received 9th December 1924.]

The relation of *Platygaster vernalis*, Myers, to its host the Hessian fly [*Mayetiola destructor*, Say] and the entire development of the parasite are described. The following is taken from the authors' summary :—

Platygaster vernalis develops polyembryonically in the larva of the Hessian fly, one egg giving rise eventually to approximately eight individuals. There is but one generation annually. The adult parasites emerge from their cocoons in the spring and almost immediately oviposit in the eggs of the host. By the first of June the embryos are fully formed in a well-grown host larva. The larvae feed upon the host during June and July, and then transform to pupae, which in turn become adults in August. A single egg is deposited by the parasite at each oviposition, and in such a manner that the egg always becomes lodged in the host's mid-intestine, where development to the larval stage is completed. Development begins immediately, whether the egg is fertilised or unfertilised. If more than one egg is deposited in the same host by different females one of the eggs may become aborted. Later the mid-intestine is ruptured, whereupon the secondary or mature larvae devour the entire contents of the host, leaving only the cuticula. Each larva constructs a cocoon in which it transforms to a pupa and later an adult parasite. The cluster of cocoons is surrounded by the cuticula of the host, and is further protected during the winter by the host's puparium. The adults of a brood are usually of the same sex. It is believed that the occasional mixed broods originate from a fertilised and an unfertilised egg deposited in the same host egg.

CORY (E. N.). **The Control of Insects in 1921.**—*Rept. Maryland Agric. Soc.*, vi (1921), pp. 159–168. College Park, Md., 1st March 1922. [Received 8th December 1924.]

Subsequent work on some of the pests recorded has already been noticed from the report for 1922 [*R. A. E.*, A, xi, 489]. *Scolytus rugulosus*, Ratz. (shot-hole borer) has become more abundant in peach trees and may be controlled in a limited way on old trees by the application of paradichlorobenzene dissolved in pine-tar creosote and made into an emulsion with caustic soda, diluted at the rate of 1 to 5. This mixture has also been used successfully against a pine bark beetle.

Various proprietary dusts were tried for the control of *Eulecanium nigrofasciatum*, Perg. (terrapin scale), none of which proved effective. *Rhagoletis pomonella*, Walsh (apple maggot) is recorded for the first time from Maryland. *Macrodactylus subspinosus*, F. (rose chafer) has been successfully controlled by proprietary brands of pyrethrum in both dust and liquid forms.

CORY (E. N.). **Oriental Peach Moth, Japanese Beetle and European Red Mite.**—*Rept. Maryland Agric. Soc.*, viii (1923), pp. 164–171. Baltimore, Md., 1st May 1924. [Received 8th December 1924.]

The oriental peach moth [*Cydia molesta*, Busck] has at least 4 broods a year in Maryland, the life-cycle usually requiring about 30 days. Nicotine sprays destroy the eggs, but are not generally recommended, as it is difficult to time their application so as to obtain satisfactory results. Where, however, injury is very severe, the addition of nicotine, 1–800, to the regular sprays may be of value. The heaviest infestation generally occurs during the first three years after the establishment of *C. molesta* in a fresh locality, after which its parasites reduce it to almost negligible numbers. The recent spread in the United States of the Japanese beetle [*Popillia japonica*, Newm.] and its life-history are outlined, attention being drawn to the almost inevitable introduction of this pest into Maryland. The provision of a fund for such emergencies is urged. Work in connection with the control of the European red mite [*Paratetranychus pilosus*, C. & F.] has already been noticed from a more detailed account [*R. A. E.*, A, xii, 589].

[**Entomological Notes.**]—*42nd Ann. Rept. Ohio Agric. Expt. Sta. 1922–23*, Bull. 373, pp. 37–41. Wooster, Ohio, 1923. [Received 10th December 1924.]

With the exception of some of the north-eastern counties, the Hessian fly [*Mayetiola destructor*, Say] has been kept well under control in Ohio; where no wheat has been planted before the safe dates for two seasons, the fly is almost absent. Experimental work has been started against the European corn borer [*Pyrausta nubilalis*, Hb.] to obtain information concerning the relative infestation of different varieties of maize and the effectiveness of cultural remedial measures. By inducing larvae of *Heliothis* (*Chloridea*) *obsoleta*, F. (corn ear worm) in captivity to descend into the soil for pupation it was proved that this species winters successfully in the pupal stage in Ohio. At least part of the

annual infestation is produced by overwintering individuals and is not, as was previously thought, entirely the result of invasion from the south.

Phytometra (*Autographa*) *brassicae*, Riley (cabbage looper) is generally controlled by a bacterial disease. Against this moth the best results were obtained by dusting after every rain, or every two weeks in the absence of rain, with Bordeaux powder 25 per cent. and calcium arsenate 75 per cent. by weight. Lead arsenate instead of calcium arsenate also gave good results; other successful mixtures were lead or calcium arsenate powder and hydrated lime 1 to 8 parts by weight.

Information concerning the apple flea weevil [*Rhynchaenus pallicornis*, Say] has been noticed at length from another source [*R. A. E.*, A, xii, 239].

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 5, pp. 378–379. Pretoria, November 1924.

Nomadacris (*Cyrtacanthacris*) *semptemfasciata*, Serv. (red locust) is recorded from the Transvaal. A dead example of the Mexican cotton boll weevil [*Anthonomus grandis*, Boh.] has been found in imported cotton seed from America covered by an official oversea inspection certificate and treated twice for the destruction of insects before reaching South Africa. This shows how easily a formidable pest might be introduced were drastic precautions not exercised.

Mally (C. W.). **The Eucalyptus Snout-beetle.** (*Gonipterus scutellatus*, **Gyll.**)—*Jl. Dept. Agric. Union S. Africa*, ix, no. 5, pp. 415–442, 7 pls., 10 figs. Pretoria, November 1924.

This weevil was first recorded in the vicinity of Capetown in 1916, and was probably imported from Tasmania. There has been some dispute about its identity, but the name *Gonipterus scutellatus*, Gyll., is at present used for it. It causes considerable injury to *Eucalyptus*, the severity of the infestation depending on the species attacked; those preferred are, in order of preference, *Eucalyptus viminalis*, *E. punctata*, *E. globulus*, and *E. urnigera*, whilst some species appear to be entirely immune. The defoliation of plantations of the preferred species has caused the death of some trees and seriously diminished the value of others. The eggs are laid in brownish capsules attached to the leaves and hatch in 2 or 3 weeks; the larvae feed at once on the soft surface of the leaf and when ready for pupation drop to the ground. The firmer the ground, the nearer to the surface is the pupal cell. Feeding of the larvae continues for 5 to 8 weeks, and then 2 or 3 months are passed in the ground. The larvae are most numerous in the spring and in the late summer. There is time for two generations in the year.

No parasites of this weevil have been found, and contact insecticides are considered of little value; both adults and larvae, however, readily succumb to lead arsenate. This or some other arsenical might prove of value on hedges or in young plantations; in larger areas arsenical dusts applied from an aeroplane might prove successful. The planting of a belt of susceptible species of *Eucalyptus* as a protection to less susceptible ones is also suggested.

The Locust Campaign for 1924-25.— *Jl. Dept. Agric. Union S. Africa*, ix, no. 5, pp. 443–447. Pretoria, November 1924.

The probable extent of invasion by locusts in South Africa and the adjoining countries is briefly outlined, and the organisation of the campaign against them is discussed.

Sodium Fluoride and Cut-worms.— *Jl. Dept. Agric. Union S. Africa*, ix, no. 5, pp. 458–460. Pretoria, November 1924.

Clean cultivation is one of the most important factors in the control of cutworms infesting maize. It has been found that the best time for ploughing in most parts of the Union of South Africa is about 50 days before germination is expected, *i.e.*, 40 days before planting. The exact time depends on the locality and season, as the warmer it is, the shorter the interval between ploughing and germination should be. The interval should be extended for a few days if the weather is especially cold after ploughing, and it is safer to make it rather too long than too short. The land should be kept free from weeds until a few days before planting, the absence of weeds during the first 30 after ploughing is more important than during the latter part. To achieve this it is usually necessary to harrow 15 or 20 days after ploughing, depending on rains. This practice is based on the supposition that the female moths are attracted to weedy areas and that eggs will not be laid on clean land in appreciable numbers, and it will prevent the laying of all eggs that would produce larvae old enough to injure the maize during the first 15 days, when it is susceptible to severe damage.

Poison baits are particularly suitable for use against cutworms on vegetables and tobacco. As a result of extensive laboratory experiments, a new bait has been developed, the formula for which must be followed closely in order to ensure the desired effect. To 2 gals. of clean soft water add 6½ oz. of commercial sodium fluoride (95 per cent. pure, approximately) and stir. Chop up an equal volume (2 gals.) of prickly-pear into pieces the size of a thumb. The pieces should be cut cleanly and not crushed. Add the prickly-pear to the solution and stir. Soak overnight, preferably stirring once or twice during the soaking; drain through a coarse sack or some wire mesh; and save the liquid residue, which will keep indefinitely, for house-fly bait. Spread the bait broadcast or drop a little nearly touching the stem of each young plant. It should be used the same day that it is made, as it will not remain attractive for more than 2 or 3 days, even when kept in the solution. It should be spread in the late afternoon or on a cloudy day, but does not dry so quickly as to prevent its use on a sunny day if necessary. All baits are more effective when spread after the land has been cleared of weeds for a few days.

Neither of the above remedies has been subjected to extensive field trials as yet.

Runne (H.). **Die chemische Konstitution des wirksamen Bestandteiles des Dalmatinischen Insektenpulvers.** [The Chemical Composition of the Active Principle of Dalmatian Insect Powder.]—*Pharmazeut. Nachrichten*, i, no. 5, pp. 99–100, 1924. (Abstract in *Deutsche tierärztl. Wochenschr.*, xxxii, no. 46, p. 703. Hanover, 15th November 1924.)

This is a brief account of previous work done on the chemistry of pyrethrum obtained from *Chrysanthemum cinerariaefolium*.

FAURE (Jean C.). **Sur l'importance croissante de l'arsenic dans la lutte contre les ennemis des plantes.**—*Prog. agric. & vitic.*, lxxxii, no. 48, pp. 524–526. Montpellier, 30th November 1924.

Of a total world production of 10,000 tons of pure arsenic, France produces about half, but she could easily increase this amount and, by transforming the arsenic that is frequently considered a useless by-product of her metal industries into arsenical insecticides, could ensure an appreciable increase of revenue. Calcium arsenate is the preferred form. Statistics are quoted showing that, for insecticidal purposes, America has decidedly insufficient for her needs and must leave large tracts, such as the cotton-growing regions of the south, undefended. The loss in the United States in 1919 from insect depredations has been estimated at $1,261,291,000.

FEYTAUD (J.). **La question doryphorique vue de l'étranger.**—*Bull. Soc. Agric. France*, lvi, no. 11, pp. 309–310. Paris, November 1924.

The prompt and thorough measures undertaken by the French Ministry of Agriculture to deal with the outbreak of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in France have resulted in allaying any alarm with regard to the potato industry in general, by limiting the infested zone strictly to the region in which the outbreak originated, but the danger is not yet over and the campaign must be continued with equal thoroughness. The legislation passed by other countries as a safeguard against the introduction of the beetle is quoted.

FEYTAUD (J.). **Sur la diffusion naturelle du Doryphore en 1923.**—*Rev. Zool. agric. & appl.*, xxiii, no. 8, pp. 177–182. Bordeaux, August 1924.

Notes are given on the manner and extent of the spread of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) in France since its first appearance in Gironde in 1922. A map shows the area of infestation in 1923, and observations in regard to possibilities of windspread both in France and America are discussed. It is known in America that the principal, in fact almost the only, method of spread is in the adult stage, by means of natural flight and by transport on man or vehicles. It is significant that the furthest limit of spread discovered up to June 1923 was at a radius of about 87 miles from the centre of infestation in June 1922, which is approximately the distance indicated as that of the annual spread of the pest in America. All the infested areas found in 1923 in France are within the area of natural flight of the beetle, which occurs chiefly before and after hibernation, the former (in autumn) being the larger flight. It is essential that prompt and energetic measures should be taken to exterminate the insect in any areas where adults emerging from the ground, pupae or large larvae are observed; this is especially important in April–May and August–September. Care should be taken to avoid the application on areas where the pest is established of mere repellents, such as Bordeaux mixture, or the reduction of the food-plants, which would cause flight of the beetles and thus extend the infestation. All infested areas outside the main area of infestation should be immediately suppressed, and the restrictions regarding transport from infested areas must be rigorously maintained.

SANTUS (G.). **Les collections scolaires d'insectes.**—*Rev. Zool. agric. & appl.*, xxiii, no. 8, pp. 182–187. Bordeaux, August 1924.

The collection of insects by pupils in schools is encouraged by the Société de Zoologie agricole, with a view to familiarising future agriculturists with insect pests and with those species that are beneficial. Lists are given of the insects most generally figuring in such collections.

PETHYBRIDGE (G. H.). **Potato Leaf-roll.**—*Jl. Minist. Agric.*, xxxi, no. 9, pp. 863–869, 1 pl. London, December 1924.

An account is given of leaf-roll of potatoes, the susceptibility of different varieties, the losses due to the disease, its symptoms, cause and transmission. The author considers that the part played by insects other than Aphids in transmitting the disease requires further proof [*cf. R.A.E.*, A, xi, 92, 392]. Aphids on sprouting potatoes may be destroyed by fumigating the tubers in their sprouting boxes with tetrachlorethane at the rate of ½ pint per 1,000 cu. ft. of space, two or three days being allowed for the process.

HORI (M.) & OSHIMA (K.). **The Insect Fauna of the Genus *Populus* in Japan and its Relation to Horticulture and Agriculture.**—*Hokkaido Nokaiho*, xxiv, no. 4–5, pp. 1–34. Hokkaido, 1924. (In Japanese.)

A list is given of the insects occurring on *Populus* in Japan. At present 114 species belonging to 25 families of 4 orders are known on these trees. The most injurious are the moths, *Porthetria* (*Lymantria*) *dispar*, L., *Stilpnotia salicis*, L., and *Pterostoma palpinum*, L.; the beetles, *Melasoma aenea*, L., and *Popillia japonica*, Newm.; and a sawfly, *Trichiocampus populi*, Okam.

TANAKA (K.). **Life-history Studies on *Camptoloma interiorata*, Wlk.**—*Insect World*, xxviii, no. 11, pp. 362–368. Gifu, November 1924. (In Japanese.)

The Hypsid moth, *Camptoloma interiorata*, Wlk., sometimes occurs in abundance in Japan. There is one generation a year, the adults appearing from the middle of June onwards. The larvae feed on the leaves of *Quercus* spp., *Rubus palmatus* and *Pasania cuspidata*, and live in webs on the lower surfaces of the leaves; they hibernate in webs on the stems or branches. More than 200 hibernating larvae may be found in each web. At the end of May they pupate among fallen leaves on the ground. They are very inactive and are parasitised by *Tetrastichus* sp.

TAKAHASHI (R.). **Aphididae of Formosa. Part 3.**—*Dept. Agric., Govt. Res. Inst.*, Rept. no. 10, 121 pp., 10 pls. Taihoku, Formosa, July 1924.

This report gives the results of studies on Aphid nymphs, and certain species are described from Formosa and Japan. Notes are also given on some species and keys for the identification of the nymphal instars, together with a supplementary food-plant catalogue of the Formosan APHIDIDAE.

(K2338) Wt P.23/D.16 1,500 2/25 H & Sp Gp 52

The following species are recorded for the first time from Formosa : *Macrosiphum smilacicola*, sp. n., on *Smilax stenopetala*, *M. perillae*, sp. n., on *Perilla eocymoides*, ?*Myzus varians*, Davidson, on *Clematis* sp., ?*M. plantagineus*, Pass., on *Plantago major*, *Capitophorus braggi*, Gill., on *Cirsium japonicum*, *Aphis petasiticola*, sp. n., on *Petasites tricholobus*, *Anuraphis artemisiae*, sp. n., on *Artemisia capillaris*, *Hyalopterus chenopodii*, Schr., on *Chenopodium album*, *Greenidea tenuicorpus*, Okay., on *Castanopsis subacuminata*, *Myzocallis formosanus*, sp. n., on *Arundinaria* sp., *Dilachnus formosanus*, sp. n., and *Unilachnus orientalis*, sp. n., on *Pinus*, *Aiceona osugii*, sp. n., on an unknown plant, *Oregma koshunensis*, sp. n., and *O. pseudomontana*, sp. n., on *Bambusa*, *O. alexanderi*, sp. n., and *O. formosana*, sp. n., on *Dendrocalamus latiflorus*, *O. oplismeni*, sp. n., on *Oplismenus*, *Cerataphis formosanus*, sp. n., on *Cocos* sp., and *Eriosoma clematicola*, sp. n., on *Clematis fouriana*.

New species from Japan are *Macrosiphum esakii* on *Paederia tomentosa*, *M. smilaceti* on *Smilax chinensis*, *Myzus rhois* on *Rhus vernicifera*, *Patchia spiraeae* on *Spiraea cantoniensis*, and *Oregma japonica* on *Bambusa* sp.

Okamoto (H.). **Jassidae and Fulgoridae injurious to the Rice Plant in Korea.**—*Korea Agric. Expt. Sta.*, Rept. no. 12, pp. 1–37, 3 pls. Korea, June 1924.

There are 23 species of Jassids and Fulgorids injurious to rice in Korea, of which *Nephotettix apicalis*, Motsch., var. *cincticeps*, Uhl., *Liburnia oryzae*, Mats., and *L. furcifera*, Horv., are the most important. Descriptions are given of all these species. There have been many records of the abundance of these insects recently in Korea.

Pettit (R.H.). **Report of the Section of Entomology [Experiment Station].**—*62nd. Ann. Rept. State Bd. Agric. Michigan 1922–23*, pp. 219–235, 14 figs. East Lansing, Mich., 1924. [Received 10th December 1924.].

There was a notable infestation of *Acyrthosiphon* (*Illinoia*) *pisi* (green pea aphis) on peas and lucerne in Michigan in 1922. On peas several tests of dusts were made with a large power duster; though the expense of dusting was rather higher than that of spraying, it is much quicker in practice. On lucerne reduction of the numbers to normal proportions was largely due to the presence of Coccinellids, two species of Hymenopterous parasites, one of which is *Lysiphlebus* sp., and the fungus disease, *Empusa aphidis*, these factors becoming active with the occurrence of warmer weather after a backward season.

Polychrosis viteana (grape berry moth) was more prevalent and injurious than ever before in Michigan. The life-history is apparently variable; three generations seemed to occur and to overlap considerably. The spray recommended is 1½ lb. lead arsenate to a barrel of Bordeaux, with 1 lb. resin fish-oil soap as an adherent. Each acre requires 300 U.S. gals., applied under pressure, shot upward from below by the trailer method—that is, by a man following the spray apparatus with an extension and a nozzle set at right angles to the extension. The first application should be made just before the blossoms open, a second when the fruit is well set, and a third just before most of the berries

touch and become tightly packed in a cluster. A fourth spray might be given two weeks later as an emergency measure. All brush and rubbish should be cleared away. As leaves bearing pupae generally fall and lie on the ground during the winter, early ploughing under of leaves and a cover crop is a great advantage; if the latter be sown early enough to get its growth in autumn and be turned under early in the spring, many pupae will be destroyed.

Chinch bugs [*Blissus leucopterus*] were very injurious to maize, and every effort should be made to stop their progress before maize is reached. Various types of barrier for this purpose have been described [*R.A.E.*, A, viii, 504, etc.]. The most successful under Michigan conditions proved to be a barrier made by dragging a weighted plank, 10 to 12 in. wide, across the line of advance, thus forming a smooth path on which to lay tar. If the insects have reached the maize, the path should be laid a few rows ahead of the line of infestation. In the centre of the path, a series of post-holes, with bevelled edges, 12 in. deep and 20 to 30 ft. apart, are dug. Tar should be laid about an inch wide on the side of the path furthest from the migrating insects, so that it touches the rim of each hole. They will not cross the tar, but will travel parallel to it until they fall into the holes. In each hole should be placed about 2 in. of hydrated lime, which should also be dusted round the sides about half way up. The insects are soon suffocated in this. The holes should be visited once daily to stir the lime, which should be renewed every 3 or 4 days. The trench method of trapping the bugs is also described, as well as the destruction of winter quarters by fire.

Grasshoppers are becoming much less troublesome, probably owing to the increasing numbers of natural enemies. *Bruchus obtectus* (bean Bruchid) has been increasing in abundance and seriously affecting the white bean trade, which is important in Michigan. Growers are urged to fumigate the beans as soon as infestation appears. *Erythroneura* (*Typhlocyba*) *tricincta* (three-banded grape leafhopper) appeared in numbers, but the remedies described for the previous year [*R.A.E.*, A, xii, 279] much lessened the loss from this cause. *Empoasca fabae* (*mali*) (potato leafhopper) was troublesome in lucerne; this emphasises the necessity for burning all rubbish and fallen leaves that offer hibernation quarters. The termite, *Leucotermes flavipes*, does much damage in orchards, working from its nests in old stumps to the young trees and feeding on otherwise healthy young roots and riddling them. A treatment with paradichlorobenzene drove the termites down to a point where the gas did not reach them, but also injured the young trees to some extent. The old stumps should be removed, and the nests treated with carbon bisulphide.

A successful repellent has at last been found for the flat-headed borer, *Chrysobothris femorata*; 50 lb. potash soap is placed in 3 U.S. gals. water over steam pipes and allowed to soften for a few days, then placed in a double boiler and heated until the temperature reaches 180° F; 2 lb. flour and 25 lb. flake naphthaline are then stirred in, and the temperature again brought to 180° F., at which point the naphthaline will have melted; the mixture is then allowed to cool as quickly as possible, while being stirred occasionally. This mixture may be made up during the winter and stored in air-tight drums. It should be applied with a brush after warming and thinning slightly to the consistency of heavy cream. In experiments, applications were made in June. The tests have been continued for about four years, on

several thousand [apple] trees, and no injury to them has resulted. The same treatment would probably protect the trunks and limbs of various trees from other borers.

Contarinia johnsoni (grape blossom midge), which had hitherto been restricted to a very limited area in Michigan, has now become widely distributed over the grape-growing belt. *Frankliniella* (*Thrips*) *tritici* (peach thrips) continues to do considerable damage every year in Michigan, by spoiling the appearance of high grade peaches, and is appearing in other States also. *Dioryctria reniculella* (spruce cone worm) appears in the larval stage on young and tender leaders of Norway spruce [*Picea excelsa*], sometimes at the side and sometimes tunnelling up the centre, so that in many cases the leaders are destroyed. *Bucculatrix canadensiella* (birch leaf skeletoniser) is troublesome each year on white birches [*Betula alba*], the larvae skeletonising the leaves, and the infestation seems to be spreading. Lead arsenate sprays are recommended. Minor pests included *Loxostege similalis* (garden webworm) on lucerne seedlings, for the control of which the use of the cultipacker was superior to that of the ordinary roller; the bumble flower beetle [*Euphoria inda*], which appeared during the autumn and destroyed a certain amount of fruit, and which, owing to the lack of adequate remedies, is more to be dreaded than some of the more serious pests; and *Diabrotica vittata* (cucumber beetle).

New Clothes-moth Repellant.—*Official Record, U.S. Dept. Agric.*, iii, no. 51, p. 3. Washington, D.C., 17th December 1924.

Paradichlorobenzene has been found by the U.S. Bureau of Entomology to be thoroughly satisfactory as a protection against all stages of clothes moths in air-tight containers.

Hartzell (F. Z.). **Dusting and Spraying to control Grape Root-worm.**—*New York Agric. Expt. Sta.*, Bull. 519, 29 pp., 2 pls. Geneva, N.Y., July 1924. [Received 13th December 1924.]

In view of the unsatisfactory nature of the remedies previously devised against *Fidia viticida*, Walsh (grape root-worm) [*R. A. E.*, A, vii, 495], a series of experiments was undertaken during 1921 and 1922. No dust was discovered that will control either this insect or powdery mildew. Dusts made after Sanders' formula (10 per cent. copper sulphate, 80 per cent. hydrated lime and 10 per cent. lead arsenate) do not adhere to the foliage of the Concord grape, and as this variety is very susceptible to scorching, any other formula should be very thoroughly tested before use on a large scale. Growers are strongly recommended to use a spray of 100 U.S. gals. Bordeaux mixture (8 : 8 : 100) with either 3 lb. dry or 6 lb. paste lead arsenate for the control of both insect and fungus. The addition of 3 lb. resin fish-oil soap is advisable to improve the spreading qualities of the spray.

Thatcher (R. W.) & Streeter (L. R.). **Chemical Studies of the combined Lead Arsenate and Lime-sulfur Spray.**—*New York Agric. Expt. Sta.*, Bull. 521, 20 pp. Geneva, N.Y., August 1924. [Received 13th December 1924.]

A review of many investigations into possible combinations of sprays shows that when acid lead arsenate (which is more efficient as an

insecticide than basic lead arsenate) is mixed with lime-sulphur solution, a definite chemical change takes place whereby the weight of insoluble solid matter in the mixture is nearly doubled. Chemical changes can be prevented by adding hydrated lime, but the solid residue in the spray mixture is thereby correspondingly increased. The undesirable reaction does not take place if preparations containing casein (which also acts as a spreader) are used in small proportions. Skim-milk, with added lime, or commercial calcium caseinate preparations may be used for this purpose. The indications are that there is little likelihood of reduction in efficacy of the sprays combined in this way, while the danger of scorching seems to be reduced to a minimum. The addition of tobacco dust to combined lead arsenate and lime-sulphur sprays also prevents undesirable reaction in the compounds, without the addition of casein or lime [*cf. R.A.E.*, A, xiii, 50].

STEWART (F. C.) & PARROTT (P. J.). **Experiments with Potatoes. (i.) Dusting versus Spraying.**—*New York Agric. Expt. Sta.*, Bull. 518, pp. 3–29. Geneva, N.Y., July 1924. [Received 13th December 1924.]

Experiments have been made for 4 years to compare the efficiency of Sanders' copper lime-dust with liquid Bordeaux for the control of the insect and fungus enemies of the potato. The dust used was various mixtures of copper-sulphate and lime and sometimes calcium arsenate. The Bordeaux mixture was sometimes combined with lead arsenate (5 lb. powder to 100 U.S. gals.). In each year, the spray gave much better results than the dust, both in the control of blight and of leafhoppers [*Empoasca fabae*, Harr.] causing hopperburn.

SNYDER (T. E.) & ST. GEORGE (R. A.). U.S. Bur. Ent. **Determination of Temperatures fatal to the Powder-post Beetle, *Lyctus planicollis* Leconte, by steaming infested Ash and Oak Lumber in a Kiln.**—*Jl. Agric. Res.*, xxviii, no. 10, pp. 1033–1038, 1 pl. Washington, D.C., 7th June 1924. [Received 19th December 1924.]

The material used in these experiments consisted of infested ash and oak lumber. The ash had been piled for nearly 10 years in the open, where it was exposed to attack by *Lyctus planicollis* Lec. (southern powder-post beetle). The larvae had practically ruined the sapwood, rendering it unfit for any use but fuel. The type of kiln used is described. Each lot was treated by keeping it at a certain temperature for a definite period of time before changing to a higher temperature, and removing pieces at each rise of 10° F. A final examination was made four weeks later. All tests were conducted in a practically empty kiln. When the kiln is full of lumber, time should be allowed for all parts of the wood to reach kiln temperature, at which it should be kept for the length of time found to be fatal to the insects. Temperatures of 130° F. and upward maintained for 1½ hours or longer are fatal to the insects. It was found that the standard kiln-drying schedule for ash and oak, to be used for aircraft stock, in a kiln operated by live steam will prove fatal to the powder-post beetle and will check all damage that is being done in any infested material.

Back (E. A.) & Cotton (R. T.). U.S. Bur. Ent. **Relative Resistance of the Rice Weevil,** *Sitophilus oryzae,* **L., and the Granary Weevil,** *S. granarius,* **L., to High and Low Temperatures.**—*Jl. Agric. Res.*, xxviii, no. 10, pp. 1043–1044. Washington, D.C., 7th June 1924. [Received 19th December 1924.]

Though these weevils are much alike as to size, structure and habits, they differ greatly in their resistance to high and low temperatures. Whereas *Calandra* (*Sitophilus*) *oryzae* is predominant in the middle and southern States, it is not established in the northern ones, where it is unable to withstand the winter except in protected situations. *C.* (*S.*) *granaria* is seldom found south of North Carolina. Experiments under laboratory conditions showed that 0° F. was quickly fatal to both species, adults of *C. oryzae* being killed in 4 hours and those of *C. granaria* in 5. The results of exposure to different temperatures are given, showing in every case the greater susceptibility of *C. oryzae*. At temperatures ranging from 50 to 60° F. the normal lives of both species were greatly prolonged, extending from the usual average in summer of 100–200 days in the case of *C. oryzae* to 558, and from 200–250 for *C. granaria* to 873. The immature stages of the two species show the same differences of susceptibility to low temperatures. There appear to be no very great difference in the reactions of the two species to high temperatures; in both cases temperatures above 95° F. proved fatal. They survived for 9 days at a temperature ranging between 95 and 98° F.; at 120° F. both species were killed in 3 hours, and at 130° F. in 30 minutes. Oviposition ceased at a constant temperature of 94° F. These experiments are being continued.

Dunnam (E. W.). **The Apple Trumpet Leafminer** (*Tischeria malifoliella* **Clem.**).—*Iowa Agric. Expt. Sta.*, Bull. 220, pp. 51–70, 6 figs., 2 pls. Ames, Iowa, June 1924. [Received 22nd December 1924.]

Tischeria malifoliella, Clem. (apple trumpet leafminer) feeds on different species of *Malus*, including all varieties of apples, and also on *Crataegus*. One leaf may support as many as 68 larvae. Infestation may cause defoliation, followed by premature, undersized fruit and lessened vitality of the tree.

The various stages of this moth are described. Its distribution in the United States is transcontinental, but it is more injurious throughout the eastern United States. It has been recorded from Ottawa, Canada. The average number of eggs laid by each female is 50. Under greenhouse conditions with temperatures varying from 62 to 92°F. they hatched in from 8 to 12 days, and under more normal conditions outside (61 to 89° F.) in from 9 to 13 days. The minimum period of larval development was 13 days at a mean temperature of 80·9° F., but below this it was prolonged to 17 days. The pupal period varied from 6 to 12 days according to temperature. In Iowa the insect hibernates in the larval stage and pupates early in the spring, the first pupa being found on 22nd March. The first moths emerged 1st May, giving rise to the spring brood of larvae in May and June. These emerged as adults by 1st July. The larvae from this brood began to pupate towards the end of July, and emerged as adults in

August and early September. The larvae from these individuals appear from the middle of August and form the hibernating brood. Hibernation occurs in the leaf in specially constructed mines.

Certain Hymenopterous parasites are the greatest factors in controlling this pest. During 1922 the following were secured in Iowa: *Kleidotoma* sp., *Closterocerus tricinctus*, Ashm., *Pseudiglyphomyia nigrovariegata*, Gir., *Apanteles ornigis*, Weed, *Cirrospilus flavicinctus*, Riley, *Pleurotropis* sp., *Horismenus fraternus*, Fitch, *Eupelmus allynii*, French, *Sympiesis massasoit*, Cwfd., and *S. bimaculata*, Cwfd. A list is given of the more important hosts of these parasites, as compiled by S. A. Rohwer. Previous authors have recorded the following parasites from the eastern United States: *Sympiesis lithocolletidis*, How., *Astichus tischeriae*, How., *S. nigrifemora*, Ashm., *Elasmus pullatus*, How., doubtfully recorded from this species, *Urogaster tischeriae*, Ashm., *Horismenus popenoei*, Ashm., *Eulophus* sp., *Zagrammosoma multilineatum*, Ashm., and *Phygadeuon* sp. It is possible that some of these are hyperparasites.

Ordinary fruit sprays usually control this pest under normal conditions, but owing to the location of the larvae no spray is completely effective. All fallen leaves should be destroyed so far as possible in the autumn. Of the sprays tested the best results were obtained with nicotine sulphate, 1 pt. to 100 gals. soapy water, applied in July.

CHAMBERLIN (T. R.). U.S. Bur. Ent. **Studies of the Parasites of the Alfalfa Weevil in Europe.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 623–632. Geneva, N.Y., December 1924.

The various parasites of *Hypera variabilis*, Hrbst. (*Phytonomus posticus*, Gyll.) collected and studied in Europe are listed, with brief notes concerning their value and habits. The more important of these are: egg parasites, *Peridesmia phytonomi*, Gah., *Spintherus* sp., apparently the dominant species in the higher and colder regions of France, and *Anaphoidea luna*, Gir., particularly effective in dry stems; larval parasites, *Bathyplectes curculionis*, Thoms., already established in Utah, *B. corvina*, Thoms., and *Tetrastichus incertus*, Rtzb.; prepupal and pupal parasites, *Dibrachoides dynastes*, Först., and *Necremnus leucarthros*, Nees. *Bathyplectes curculionis* and *B. corvina* are themselves parasitised by *Mesochorus nigripes*, Rtzb., the former also by *Gelis stevenii*, Grav. *Tetrastichus incertus* is parasitised by *Eupelmus atropurpureus*, Dalm. A species of *Pleurotropis* attacks *Dibrachoides dynastes*. There is reason to believe that all these species could survive in Utah. With the exception of *Anaphoidea luna* they exist in Europe under a large range of climatic conditions; their distribution is discussed.

LARSON (A. O.) & FISHER (C. K.). U.S. Bur. Ent. **The Possibilities of Weevil Development in Neglected Seeds in Warehouses.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 632–637, 1 graph. Geneva, N.Y., December 1924.

Bean growers as well as owners of commercial bean warehouses usually keep a certain amount of beans and cowpeas over the summer. These furnish ideal breeding places for the common bean Bruchid, *Bruchus obtectus*, and for the four-spotted cowpea Bruchid, *B. quadrimaculatus*;

and frequently form the chief source of infestation for the growing crop. Heavy outbreaks in the field have been traced directly to small lots of infested seeds. The experiments recorded show that several broods may develop in a small lot of seeds. Most of the adults fly away in search of new material on which to oviposit, but enough remain among the original seeds to keep up the infestation until practically all the available food has been removed. Sixty-nine pounds of black-eyed cowpeas produced approximately 368,000 emerged adults of *B. quadrimaculatus*, or $4\frac{1}{2}$ for each seed, and were reduced 62 per cent. in weight.

BASINGER (A. J.). **A Supposedly Beneficial Insect Discovered to be a Citrus Pest.**—*Jl. Econ. Ent.*, xvii, no. 6, pp. 637–639. Geneva, N.Y., December 1924.

Holcocera iceryaeella, Riley, formerly recognised only as a predacious enemy of scale-insects, is now found to cause considerable injury to orange fruit. The previous literature concerning this moth is briefly reviewed. The larvae may be found in nests made by webbing together bits of rubbish, such as blossoms that have fallen and collected on a leaf, or in an old curled leaf or even an abandoned tortrix nest. The nest may also be found between the fruit. The injury is similar to that done by *Tortrix citrana*, Fern., but the holes and channels in the orange are usually not quite so deep or so pronounced. This moth frequently occurs with *T. citrana*, and presumably is often responsible for the damage attributed to this species or to *Platynota tinctana*, Wlk.

SEVERIN (H. H. P.). **Causes of Fluctuation in Numbers of Beet Leafhoppers (*Eutettix tenella* Baker) in a Natural Breeding Area of the San Joaquin Valley in California.**—*Jl. Econ. Ent.*, xvii, no. 6, pp. 639–645. Geneva, N.Y., December 1924.

The following is the author's abstract of this paper: The primary cause for the enormous increase of the beet leafhoppers (*Eutettix tenella*, Baker) during 1919 hinges on two factors: there were no summer migrations of the pest during 1918, so that a large number of eggs were deposited during the autumn; the nymphs that hatched from these eggs found an abundance of green food not only in the cultivated areas, but also on the plains and foothills after the heavy September rains germinated the seeds of vegetation. The factors associated with the reduction in numbers of the beet leafhoppers vary in different years. The primary cause for the enormous reduction in numbers of the spring brood hoppers on the plains and foothills during 1923 was the early drying of the pasture vegetation during March instead of April and May, as in previous years from 1919 to 1922. Secondary factors that reduce the number of leafhoppers in a natural breeding ground are natural enemies, spring and summer migrations, fungous diseases and rainfall.

CAMPBELL (R. E.). U.S. Bur. Ent. **Injuries to Peppers in California by *Anthonomus eugenii* Cano.**—*Jl. Econ. Ent.*, xvii, no. 6, pp. 645–647. Geneva, N.Y., December 1924.

Anthonomus eugenii, Cano, was recorded for the first time from California in November 1923, causing considerable injury to chillies.

The plants that were almost mature were not damaged sufficiently to render them unmarketable, but the development of the immature plants was arrested.

According to C. M. Walker the eggs are laid in small buds, blossoms and young fruit. The larvae may feed and develop in the pod wall, but are more often found in the seed cluster. The feeding tunnel is surrounded with frass, and pupation occurs within a cell made from this material.

CHAMPLAIN (A. B.). *Adirus trimaculatus* **Say—a Rose Pest.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 648–650. Geneva, N.Y., December 1924.

The Cephid, *Adirus trimaculatus*, Say, known as a borer in blackberry canes in the larval stage, has now been found to do similar damage in rose stems in Pennsylvania. Considerable injury is caused by the females puncturing the buds and terminals for oviposition. Though many eggs may be laid in the same terminal, apparently only one larva reaches maturity. The larva feeds on the pith and travels through the stem, the distance depending on the length of the shoot and the time when the egg was laid in relation to the season. At certain intervals the stem is girdled, and may break at this point. When full-grown the larva makes an opening partly through the stem to the outside and hibernates in a cocoon at the point where it left off feeding. Pupation probably occurs in the spring.

The best means of control is to cut off the infested tips as soon as injury or wilting is noticed, before the larvae work far down. These cuttings should be burnt.

SHEDD (O. M.) & OLNEY (A. J.). **The Preparation from Tobacco of a Solution for Spraying.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 650–656. Geneva, N.Y., December 1924.

The object of this paper is to emphasise the importance of knowledge concerning the nicotine content of tobacco that is to be used for home-made spray solutions. Nicotine, the characteristic alkaloid of tobacco, is a very powerful poison, particularly for certain insects, and has the particular advantage that a moderately excessive amount does not injure tender plants. It can also usually be added to certain other insecticides without detriment to either. For the preparation of sprays diseased, waste or damaged tobacco may be used, provided its approximate nicotine content is known. Tobacco stalks contain less nicotine than the stems, and the latter less than the leaf. The actual nicotine content depends on many factors, such as variety, fertility and character of soil, climate, season, curing, blight or disease, etc., and these are discussed.

STREETER (L. R.). **Lead Arsenate, Lime-sulfur, and Tobacco Dust as a Triple Spray Mixture.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 656–658. Geneva, N.Y., December 1924.

In view of the possibility of using tobacco dust as a source of nicotine in combined lime-sulphur and lead arsenate sprays, experiments were made to determine the amount of nicotine dissolved from fine ground tobacco dust by lime-sulphur. Tobacco dust containing 1·2 per cent. of nicotine was added at the rate of 200 lb. to 100 U.S.

gals. of concentrated lime-sulphur. The results show that there is little difference in the solvent action of water and lime-sulphur, and that heating does not increase the quantity of nicotine found in solution. The addition of an alkaline substance such as hydrated lime does not increase the solvent power of water or, probably, of lime-sulphur. The combination of tobacco dust and lime-sulphur may, however, liberate hydrogen-sulphide, and this may be avoided by the addition of a few pounds of hydrated lime per 100 gals. of spray mixture.

The chemical compatibility of the triple spray is discussed elsewhere [*R.A.E.*, A, xiii, 45].

SULLIVAN (K. C.) & MCBRIDE (O. C.). **The Effects of Oil Spray on Apple Aphids.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 658–660. Geneva, N.Y., December 1924.

Siphonaphis padi, F. (*Siphocoryne avenae*, F.) has been the most troublesome Aphid on apples in Missouri during the past two years. The eggs hatch about the time the buds begin to push out in the spring, and from 3 to 4 generations develop on apple before the insects migrate to grain crops. They often cause considerable damage to young, tender growth. Various oil sprays have been tried, but although some of these, as well as lime-sulphur, give partial control, they are not sufficiently effective to be recommended.

CHAMBERLIN (W. J.). **Another Lead Boring Beetle.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 660–661, 1 fig. Geneva, N.Y., December 1924.

The larva of a Longicorn, *Callidium* sp., is recorded as damaging underground cables in Oregon, thus interfering with the current. The cable covering was of creosoted cedar and lead plate, the latter 3·5 mm. thick. The larva had apparently matured in the cedar covering and worked out through the lead, storing the lead borings in the mine behind it in the same manner as wood borings. A similar case of injury by a Buprestid has previously been reported from Oregon. In this case the insect emerging from a pole encountered a lead covered cable running down the pole. The lead sheath was $\frac{1}{4}$ inch thick, and the groove gnawed by the beetle in the side of it was $\frac{1}{4}$ inch wide and about $\frac{3}{16}$ inch deep, enabling it to escape, though not entirely penetrating through the cable.

YOTHERS (M. A.). **Tree Cricket Injury to Prunes.**— *Jl. Econ. Ent.*, xvii, no. 6, pp. 661–662, 1 pl. Geneva, N.Y., December 1924.

Tree crickets, *Oecanthus* spp., have recently become one of the most important insect pests of prune orchards in southern Idaho. One of the species concerned is *O. niveus*, DeG. The injury begins about 1st August and continues until the prunes are harvested in the latter half of September. The fruit is not only rendered unsightly, but soon decays in storage, mould spreading throughout the whole package. As many as 1,386 tree-crickets have been killed under a single tree.

YAGHI (N.). **Application of the Röntgen Tube to Detection of Boring Insects.**—*Jl. Econ. Ent.*, xvii, no. 6, pp. 662–663, 1 fig. Geneva, N.Y., December 1924.

The author has used the Röntgen tube in various work on insects, including the detection of insects boring in trees, stored grains, wool, etc.; and suggests that it may be of value in studying the life of boring or parasitic insects.

BACK (E. A.) & COTTON (R. T.). U.S. Bur. Ent. **Ethyl Acetate-Carbon Tetrachloride Mixture.**—*Jl. Econ. Ent.*, xvii, no. 6, p. 663. Geneva, N.Y., December 1924.

The use of carbon bisulphide and a mixture of it with carbon tetrachloride for the fumigation of railway cars has been prohibited in the United States except at certain points owing to the danger of fire. Experiments have therefore been undertaken in which 100 organic compounds and various combinations of these were tested against *Calandra* (*Sitophilus*) *oryzae* and *Tribolium confusum*. The result of the work extending from 1922 to early 1924 is to be published later. This work and that of the summer of 1924 indicates that a mixture of 4 volumes of ethyl acetate and 6 volumes of carbon tetrachloride gives an effective non-inflammable and non-explosive fumigant against adult weevils in wheat in grain cars. The ethyl acetate should be at least 99 per cent. pure. As the vapour pressures of ethyl acetate and carbon tetrachloride are almost the same, the mixture vaporises practically as if it were a single compound. Further experiments are needed to ascertain whether any unpleasant odours will be retained by the wheat, flour or bread. At present 40 lb. of mixture is recommended for each 1,000 cu. ft. of space, at a cost of less than 6d. per lb.

SAFRO (V. I.). **Calcium Cyanide as a Greenhouse Fumigant.**—*Jl. Econ. Ent.*, xvii, no. 6, p. 667. Geneva, N.Y., December 1924.

Experiments are now being made for the fumigation of nursery stock in greenhouses by using lower concentrations of gas over a longer period (over night) rather than higher ones for only a short time. For this purpose calcium cyanide is better than liquid hydrocyanic acid, as by its property of gradual evolution of the gas it allows of a wider margin of safety to the plants.

SAFRO (V. I.). **Control of Leaf Cutting Ants.**—*Jl. Econ. Ent.*, xvii, no. 6, p. 667. Geneva, N.Y., December 1924.

In tropical and subtropical America leaf-cutting ants [*Atta*] have been successfully controlled by blowing calcium cyanide dust into the colony until all the galleries are filled. In some cases a second treatment proved necessary. A similar method has been used against the harvester ant [*Pogonomyrmex barbatus*] in the United States. In this case one or two flakes of calcium cyanide are dropped into one or more holes bored in the mound. It is not necessary to close the holes after treatment.

WESTER (P. J.). **Another Mango Pest in the Philippines.**—*Jl. Econ. Ent.*, xvii, no. 6, p. 668. Geneva, N.Y., December 1924.

Parasa lorquini, Reakirt, is recorded from the Philippines for the first time as feeding on the leaves of mango. It seems of little importance as a pest of this plant owing to the activities of internal parasites. A related moth, *P. lepida*, feeds on leaves of mango in India, sometimes completely defoliating young grafts and seedlings, though it does not appear to be of any great importance on old trees.

QUAYLE (H. J.). **Calcium Cyanide Dust for the Grape Leaf Hopper.**—*Jl. Econ. Ent.*, xvii, no. 6, p. 668. Geneva, N.Y., December 1924.

Calcium cyanide dust has been tried against *Erythroneura* (*Typhlocyba*) *comes*, Say, with promising results. The leafhoppers are overcome by the gas and fall to the ground, where they do not recover if some of the calcium cyanide is on the ground. To ensure this the plants were treated with a knapsack duster from below so that the heavier particles dropped to the ground. Further work on a larger scale is to be carried out during the coming year.

SCOTT (C. E.). *Tylenchus dipsaci* **Kühn on Narcissus.**—*Phytopathology*, xiv, no. 11, pp. 495–502, 1 pl., 3 figs. Lancaster, Pa., November 1924.

Tylenchus dipsaci, Kühn, causes serious injury to *Narcissus* in California. Characteristic thickened specks are formed in the leaves and flower stems, severely infested leaves being stunted and twisted and dying prematurely. The Nematodes invade the bulb scales from the corresponding leaves and kill the tissue. Control measures recommended are the destruction of the infested plants in the field, and the immersion of bulbs in water at 110° F. for three hours.

WHITE (E. W.). **Report of the District Horticulturist and Inspector of Fruit Pests, Vancouver Island and Gulf Islands.**—*18th Ann. Rept. Dept. Agric. British Columbia 1923*, pp. I 22–I 28. Victoria, B.C., 1924.

The strawberry-root weevil [*Otiorrhynchus ovatus*] increased in numbers during the year, but there was also a big increase in the number of weevil barriers erected, principally of the oil type. These barriers are rapidly being adopted as a protection in infested districts and are said to be very effective.

RUHMANN (M. H.). **Report of the Assistant Entomologist, Vernon.**—*18th Ann. Rept. Dept. Agric. British Columbia 1923*, pp. I 43–I 48. Victoria, B.C., 1924.

Cydia pomonella, L. (codling moth) is slowly spreading throughout the interior fruit sections of British Columbia, and there is no hope of its ultimate eradication; every effort should be made to co-operate in an endeavour to reduce it to a minimum. An attempt is being made to study the life-history in relation to temperature with the object of ascertaining the possibility of timing cover sprays by local thermometer readings. *Tortrix* (*Cacoccia*) *argyrospila* (leaf-roller) is a serious

pest of fruit in the interior; "Dormoil," though very expensive, proved to be an efficient spray at 8 per cent. strength, provided that application is made during the dormant season and that all the eggs are covered. Lead arsenate gave inferior results, even at a strength of 8 lb. per 100 gals. *Eriophyes pyri* is a pest throughout the apple-growing sections and is much more difficult to control than on pear, as the mite enters under the bud-scales during late autumn, whereas on pear trees it cannot get under the bud scales until the buds begin to open in spring. It is recommended that lime-sulphur be used at least 2 months before the buds break, at 1 : 9 strength, though eventually 1 : 15 may prove efficient. *Enarmonia* (*Laspeyresia*) *prunivora* (lesser apple worm) is readily controlled by lead arsenate sprays. *Eriocampoides limacina* (*Caliroa cerasi*) (cherry and pear slug) becomes serious in neglected orchards. *Syntomaspis druparum* (apple-seed Chalcid) is recorded for the first time in British Columbia. *Aegeria* (*Sanninoidea*) *exitiosa* (peach-tree borer) still causes considerable losses in peach and prune orchards; paradichlorobenzene is being tested on a large scale and, it is thought, will prove successful under British Columbia conditions. *Hylemyia antiqua* (*Phorbia ceparum*) has been controlled during the past four years by the trap-crop method, but during 1923 this was not satisfactory. Experiments are to be made to determine whether mercury bichloride can be economically applied on a commercial scale. *Chrysobothris femorata* (flat-headed apple-tree borer) caused considerable loss in a newly planted section. Locusts constituted almost an epidemic in orchards adjoining range land in certain regions, young trees being defoliated and bark stripped from young branches. An unidentified leaf-roller attacked strawberry foliage. *Aspidiotus ostreaeformis* (European fruit scale) occurs in most of the older fruit sections, and much loss on apple is caused by *Lepidosaphes ulmi* (oyster-shell scale). A list is given of insects that have been recorded during the year.

Preuss (P.). **Bekämpfung von Thrips und Engerlingen in Kakaopflanzungen.** [Measures against Thrips and Melolonthid Larvae in Cacao Plantations.]—*Tropenpflanzer*, xxvii, no. 5, pp. 170–171. Berlin, November-December 1924.

Thrips, such as *Heliothrips rubrocinctus*, and Melolonthid larvae are important pests of cacao against which no effective remedy is known. A spray of a solution of 1½–2½ per cent. of a proprietary preparation, the active agent of which is carbon tetrachloride, is said to kill thrips very rapidly without injuring the cacao trees. A 3 per cent. solution of a preparation of tar distillates, used at the rate of about 35 fl. oz. for a young tree and 52–70 for an old one, is said to free the roots from Melolonthid larvae without any ill effect on the trees having been observed, though further investigation is needed to ascertain if the soil-bacteria are destroyed.

Wille (J.). **Eine den Kaffeebau Brasiliens schwer bedrohende Schädlingsplage.** [A Pest menacing Brazilian Coffee Cultivation.] —*Tropenpflanzer*, xxvii, no. 5, pp. 171–174. Berlin, November–December 1924.

This is a brief account of *Stephanoderes hampei*, Ferr., its occurrence in Brazil, and the measures recommended there against it.

DA COSTA LIMA (A. M.). **Sobre a broca do café** (*Stephanoderes coffeae*, **Hag.**). [The Coffee Borer.]—*Chacaras e Quintaes*, xxx, nos. 4 & 5, pp. 316–319 & 413–416, 1 fig. S. Paulo, 15th October & 15th November 1924.

This paper contains a brief outline of the discovery of the coffee berry borer in Brazil. The borer found by de Campos Novaes and described as new under the name of *Xyleborus cofeicola* [*R. A. E.*, A, xi, 25] is not considered distinct from the well-known coffee berry borer, *S. hampei*, Ferr. (*coffeae*, Hag.). It is thought that its occurrence as observed by him [associated with mines in the twigs] was accidental. A description of all stages is given. Another species, which is probably indigenous, is recorded as *S. fallax*, sp. n., the characters differentiating it from *S. hampei* being described and figured.

PORTER (C. E.). **Una filoxera nueva?** [A new Phylloxera?]—*Rev. chil. Hist. nat.*, xxvii (1923), p. 25. Santiago, 1924.

An Aphid of the genus *Phylloxera* is recorded on *Nothofagus procera* and on oaks in Chile.

PORTER (C. E.). *Phrygilanthus* **y Coccidos.**—*Rev. chil. Hist. nat.*, xxvii (1923), p. 107. Santiago, 1924.

The Coccid, *Saissetia oleae*, Bern., was taken on *Phrygilanthus tetrandus*, which does not seem to have been previously recorded as a food-plant of scale-insects.

TRUJILLO PELUFFO (A.). **La erinosis o fitoptosis de la vid.** [Infestation of the Vine by Mites.]—*Uruguay: Minist. Ind., Defensa Agricola, Bol. mens.*, v, no. 8–9, pp. 123–125, 3 figs. Montevideo, September–October 1924.

This brief account of the infestation of grape-vines by the mite, *Eriophyes vitis*, does not contain any new information.

MESA CARRIÓN (F.). **Experiencias realizadas con arsenicales para combatir el "Gusano de los Manzanos"** *Carpocapsa pomonella*. [Experiments with Arsenicals against the Apple Worm, *Cydia pomonella*.]—*Uruguay: Minist. Ind., Defensa Agricola, Bol. mens.*, v, no. 8–9, pp. 142–143. Montevideo, September–October 1924.

A series of test sprayings in Uruguay with lead arsenate, calcium arsenate and Urania green, showed that while 20 per cent. of the fruits on the apple trees used as controls were infested by *Cydia pomonella*, those on trees that had been sprayed were almost all free from attack. Furthermore, *Eriocampoides limacina* was absent on the treated trees, while the bagworm, *Oecticus kirbyi* var. *platensis* was rare.

BRITON-JONES (H. R.). **The Purple Leaf Blotch of Strawberry.**—*Ann. Rept. Agric. & Hortic. Res. Sta., Long Ashton, Bristol, 1923*, p. 88. Bath [1924].

Purple leaf blotch of strawberry was very prevalent in the western counties in 1923, damaging in many cases over 50 per cent. of the total

leaf surface. The Royal Sovereign variety was particularly attacked. Observations in the field have proved beyond doubt that the disease is due to attack by the Aphid, *Myzus fragariella*, Theo., while the leaves are not yet unfolded. Young leaves show the presence of these Aphids between the folds, the parts they have attacked showing pale green when held to the light. As the leaves grow and unfold these pale areas turn to a reddish-purple colour; occasionally they are too much damaged to unfold properly, and the infested leaves always have a crinkled appearance and sometimes split. Remedies have not yet been investigated, but observations indicate that spraying will not be successful owing to the difficulty of penetrating between the compact folds of very young leaves.

Fox-Wilson (G.). **The Eucalyptus Psylla,** *Eurhinocola eucalypti* **(Maskell).**—*Gard. Chron.*, lxxvi, no. 1982, p. 425, 2 figs. London, 1924.

Eurhinocola eucalypti, Mask., appears to be spreading in Britain; it is found on *Eucalyptus globulus*, and has also been recorded from *E. cordata* in Sussex. All stages are found throughout the year and increase very rapidly on plants moved into glasshouses during the winter. Sooty moulds develop on the sticky exudations of the insects, which choose the youngest shoots for attack.

Remedial measures include spraying with a wash of $\frac{1}{3}$ oz. nicotine (98 per cent.) and $6\frac{1}{2}$ oz. soft soap to 4 gals. water and, for plants under glass, fumigation with nicotine vapour or hydrocyanic acid gas. A second fumigation is necessary to kill the larvae that were in the egg stage at the time of the first, as this stage is immune from the effects of the fumigation.

Rhynehart (J. G.). **The Larva and Pupa of** *Trichocera regelationis* **L. (Diptera, Rhyphidae).**—*Proc. & Repts. Belfast Nat. Hist. Phil. Soc., 1922–1923*, pp. 36–47, 3 pls. Belfast, 1924.

The larvae of *Trichocera regelationis*, L., can hardly be regarded as major pests as they do not originally attack sound tissue. If swedes or turnips have begun to rot, however, the presence of the larvae may hasten the process considerably. The eggs are laid in rotting portions of swedes, turnips, potatoes, etc. They hatch in 7 or 8 days, and the larvae feed in the decaying matter for about 30 days when they pupate, usually in the soil, the pupal stage lasting from 11 to 15 days. There are probably several broods in a year, the life-cycle occupying about 60 days.

Seed of good keeping varieties of roots should be sown, and the excessive use of nitrogenous fertilisers avoided if rotting of the roots is anticipated.

Descriptions of the various stages of this fly are given.

Chopard (L.). **Faune de France. 3. Orthoptères et Dermaptères.**—8vo, vi+212 pp., 466 figs. Paris, Paul Lechevalier, 1922, Price *Frs.* 18. [Received 18th December 1924.]

This work is based particularly on Finot's treatise of 1890, only supplementary descriptions being given where necessary. New features of the present work are the very complete synoptic tables and the

figures that accompany them ; the bibliography has been reduced to a minimum, and the notes on bionomics and distribution have been made as brief as possible.

LIBES (R.). **Emploi du Paradichlorobenzene contre les insectes du sol.**—*Rev. hortic. Algérie,* xxviii, no. 11, pp. 245–248. Algiers, November 1924.

This account of the successful use of paradichlorobenzene against the Buprestid, *Capnodis tenebrionis,* has been noticed from another source [*R. A. E.*, A, xii, 559].

Notes sur quelques insectes nuisibles aux arbres forestiers.—8vo, 51 pp., 13 pls. Versailles, Soc. dendrologique de France, 1923. [Received 12th December 1924.]

The principal insect pests of forest trees in France are discussed, and notes are given on their bionomies, natural enemies, and control.

PAILLOT (A.). **Sur une nouvelle maladie des chenilles de** *Pieris brassicae* **L., et sur les maladies du noyau chez les insectes.**—*C. R. hebdom. Acad. Sci.*, clxxix, no. 23, pp. 1353–1356. Paris, 1924.

It is concluded from continued investigations on polyhedral diseases of insects [*R. A. E.*, A, xii, 454], including a new disease of *Pieris brassicae,* L., that there is a type of infectious disease of Lepidopterous larvae characterised by the deterioration of the nucleus of certain cells, chiefly blood and fat cells ; to these diseases it is proposed to give the name " nuclear," as being a more general term than polyhedral. The cause of these diseases in insects is an endocellular micro-organism, visible ultra-microscopically, but not colourable by ordinary methods. Such micro-organisms cannot be classed with certainty among the bacteria or the protozoa. These nuclear diseases are hereditary.

AGUILÒ (I.). **La campaña contra la mosca olearia realizada por la Estación Olivarera de Tortosa.** [The Work against the Olive Fly done by the Olive Station of Tortosa.]—*Bol. Agric. téc. y econ.*, xvi, no. 191, pp. 994–1000. Madrid, 30th November 1924.

A campaign against the olive fly [*Dacus oleae*] was begun at Tortosa in 1919, the Lotrionte method of poison baits being adopted. In 1920–21, which was a year of record crop yield, there was an extraordinarily severe outbreak of the pest, from 25 to 80 per cent. of the fruits being destroyed. These losses were due to the indifference with which the growers regarded the work previously done. Since then support has been forthcoming, and the measures have been undertaken on an increasing scale. Biological control has been tried with *Opius concolor,* but it is not yet known if this parasite can resist the winter conditions. For the bait, sodium arsenite was found preferable to sodium arsenate.

LEONARDI (G.). **Elenco delle specie di Insetti dannosi e loro parassiti ricordati in Italia fino all' anno 1911.** [Catalogue of harmful Insects and their Parasites recorded in Italy to the Year 1911.] **Part II. Fasc. 2.**—*Ann. R. Scuola Sup. Agric. Portici*, Ser. 2, xix, 143 pp. Portici, 1924.

This is a continuation of a previous list [*R. A. E.*, A, xii, 105].

MALENOTTI (E.). **La *Diaspis* et la polvere.** [Dust and *Diaspis*.]—*Minist. Econ. Naz., Direz. Gen. Agric.*, [leaflet] 3 pp. November 1924.

The clouds of dust raised by motor traffic are held responsible for a decrease of the parasite, *Prospaltella berlesei*, and a consequent increase of the scale, *Diaspis pentagona*, on mulberry trees in plantations along the roads.

JABLONOWSKI (J.). **A vértetü fejlödése s irtása.** [The Development and Control of the Woolly Apple Aphis.]—*Folia ent. hungarica*, i, no. 1, pp. 11–12. Budapest, 1923. (With a Summary in German.) [Received 15th December 1924.]

This is a brief description of the development of *Eriosoma lanigerum*, Hausm., on apple and *Ulmus americana*, and of the measures against it.

JABLONOWSKI (J.). **A gabonafutrinka és védekezés ellene.** [The Corn Ground Beetle and its Control.]—*Folia ent. hungarica*, i, no. 2, pp. 34–41. Budapest, 1924. (With a Summary in German.)

A description is given of the various stages of *Zabrus tenebrioides*, Goez., which is a most important pest of cereals in Hungary. The adults appear just before barley and wheat ripen and attack the grains. The eggs are laid in the stubble fields about the time that self-sown grain begins to germinate, and if an infested barley field is sown with winter wheat or rye, the seed is eaten by the larvae in autumn and in spring up to mid-May, when pupation occurs. It was noticed that larval injury occurred 25 times in wheat following barley, 18 times in wheat following wheat, and only twice after rye. Crop rotation is the best measure ; no cereal should follow a cereal in the same or adjacent fields. Stubble should be ploughed under deeply so as to deprive the adults and larvae of their food-supply.

KADOCSA (G.). **Borsóhüvelyben élö hernyók.** [Caterpillars in Pea Pods.]—*Folia ent. hungarica*, i, no. 2, pp. 41–43. Budapest, 1924. (With a Summary in German.)

Specimens of *Etiella zinckenella*, Tr., have been bred from green pea-pods. In Hungary the larvae have also been found in the pods of *Robinia pseudacacia*, and in the summer of 1923 they did much damage to blue lupins.

Caterpillars of *Heliothis dipsacea*, L., were also obtained from pea-pods. This moth is usually a pest of maize and lucerne in Hungary.

DE STEFANI (T.). **Note intorno ad alcuni animaletti danneggiatori dei Carcioffi.** [Notes on some small Animals injurious to Artichokes.]—*R. Osserv. Fitopat. Provincie di Palermo, Girgenti e Trapani*, 16 pp., 5 figs. Palermo, September 1924. [Received 22nd December 1924.]

In Sicily the chief pests of the artichoke, *Cynara scolymus*, are the caterpillars of *Pyrameis cardui*, L., and of the Noctuid, *Hydroecia xanthenes*, Germ., especially the latter. Pupae of *H. xanthenes* collected from artichokes gave rise to adults at the end of October and in November. The female deposits about 20 eggs at the collar of the plant. Incubation requires 3 or 4 days, and the larvae disperse to the surrounding plants, of which they attack the heads, either by climbing up the stems or by boring into them and ascending the pith. The time of appearance of the moths varies in Sicily. Near the coast they may sometimes appear in June and July, but in the hills the normal time is in October and November. The larval, pupal and adult stages are briefly described.

PAOLI (G.). **La lotta contro la mosca delle olive in Provincia di Imperia nel 1924.** [Work against the Olive Fly in the Province of Imperia in 1924.]—*R. Osserv. Fitopat. Liguria*, 8 pp. Chiavari, 31st October 1924. [Received 8th January 1925.]

In 1924 concerted action was taken against the olive fly [*Dacus oleae*] in the province of Imperia, Liguria. The trees were sprayed with the commercial sodium arsenite bait solution made to the Berlese formula [*R.A.E.*, A, xii, 557] until the supply was exhausted in September, when the same solution was prepared locally. Repeated applications were made between June and October. In spite of the lack of skill of the workers and of the unfavourable effect of rain, the general result was good in comparison with conditions in untreated areas. The 12 fluid ounces of solution per tree must be evenly distributed over the entire crown ; all trees, even those of small size, must be sprayed ; the first application, being of a preventive character, requires to be made early, in order to destroy the females before they first oviposit in June ; the poison must remain on the trees for at least 10–15 days, especially after the first application. Spraying can usually be stopped in mid-September.

MALENOTTI (E.). **Una migrazione dell' Afelino a 12 chilometri.** [A Migration of *Aphelinus mali* to a Distance of seven Miles.]—*Il Coltivatore*, lxx, no. 35, pp. 518–520. Casale Monferrato, 20th December 1924.

A case is recorded in which *Aphelinus mali* has established itself on colonies of the woolly aphis [*Eriosoma lanigerum*] at a distance of 7 miles.

RHYNEHART (J. G.). **The Willow Aphis on Apple.**—*Entomologist*, lviii, no. 740, p. 19. London, January 1925.

Pterochlorus viminalis, Boy., is recorded from apple in Ireland. The trees were near infested willows, but it seems probable that this Aphid will actually breed on apple, on which it has occasionally been recorded in the past.

LAING (F.). **A Note on an Aphid New to Britain.**—*Entomologist*, lviii, no. 740, pp. 19–20. London, January 1925.

Lachnus rosae, Chlk., is recorded on roots of rose in Britain. Gaumont erected the new genus *Maculolachnus* [*R.A.E.*, A, viii, 202] for this species, but the characters on which the genus is based do not appear to be more than specific. The author is inclined to place it in *Pterochlorus*, Rond., as generally understood. The status of the latter genus is discussed, and in the author's opinion *Cinara*, Curt. (1835) takes precedence of *Pterochlorus*, Rond. (1848).

BAGNALL (R. S.). **New and Rare British Thysanoptera.**—*Ent. Mo. Mag.*, lx, pp. 269–275. London, December 1924.

The species dealt with include *Odontothrips anisomerus*, sp. n., from various localities in England and Scotland on *Lathyrus pratensis* and *Vicia cracca*; *O. mutabilis*, sp. n., from Hampshire on *Ulex europaeus*; *Oxythrips halidayi*, sp. n., on *Fraxinus* throughout the country (records of *O. ulmifoliorum* from ash are referable to this species); and *Taeniothrips inconsequens*, Uzel (pear thrips), taken in numbers on hawthorn, the female being described.

DURRANT (J. H.). **The Banana Moth,** *Hieroxestis subcervinella* **Wkr.**—*Ent. Mo. Mag.*, lxi, pp. 12–13. London, January 1925.

The synonymy of *Hieroxestis subcervinella*, Wlk. (*sanctaehelenae*, Wlk., *ligniferella*, Wlk., *plumipes*, Btlr.) is discussed. This moth, which has become a serious pest of bananas in the Canaries, is now known to occur in the Seychelles, Rodriguez, Mauritius, St. Helena and Madeira, and has also been taken in England (Margate). In Mauritius it attacks developed sugar-cane and stored potatoes and other tubers.

FOX-WILSON (G.). **The Egg of the Tarnished Plant Bug,** *Lygus pratensis* **Linn.**—*Ent. Mo. Mag.*, lxi, pp. 19–20. London January 1925.

In the south of England during the summer of 1921, when owing to the prolonged drought the usual wild food-plants of *Lygus pratensis* were killed, the adults migrated in large numbers to dahlia plants growing near waste ground. As a result of the attack some of the flowers did not open at all, and others were imperfectly formed. The oviposition period lasted from the third week in August to the second week in September, the eggs being laid in the unopened flowers. Only a single egg was found in each flower; this was placed towards the base of the inner florets. Eggs were not found in the stems and buds. Certain varieties of the plants proved more attractive than others. The egg is described. The adults remained on the plants until the frost killed the latter. Chrysanthemums were also attacked, observations suggesting that eggs were also laid on these plants.

RYLE (G. B.). **The Conifer Spinning Mite or Red Spider,** *Paratetranychus* (*Oligonychus*) *ununguis*, **Jacobi.**—*Qtrly. Jl. Forestry*, xix, no. 1, pp. 31–39, 7 figs. London, January 1925.

Coniferous trees in Britain are frequently infested by *Paratetranychus ununguis*, Jac. (conifer spinning mite). It apparently confines itself

chiefly to Sitka spruce (*Picea sitchensis*), but has also been found on *P. alba*, *P. engelmanni*, and, occasionally, *P. excelsa* (Norway spruce), and has been recorded on Scots pine [*Pinus sylvestris*], silver fir [*Abies pectinata*] and perhaps larch. There are several generations a year, the eggs of the last generation remaining on the needles and stems until the following year. They hatch in the early spring, and the larvae immediately begin to feed. The larval stage only lasts a few days. The nymphs spin a good deal of web, which serves to protect them from wind and rain. The mite is mature in about 2 weeks from the hatching of the egg, and in summer the incubation period is about 10 to 14 days. Oviposition begins very shortly after the final ecdysis. The needles are injured by the mites sucking the cell sap, causing dingy patches to appear on them and retarding growth. The mites are particularly attracted to the newly formed shoots. The eggs are very difficult to kill, so that remedies are best directed against the adult or immature mites. The only time when few eggs are present is when the first generation of mites is nearing the adult stage. Of the sprays tried, a weak solution of common yellow or soft soap gave as good results as any, the mites being rapidly killed by suffocation. Nicotine was quite ineffective. Records are given of experiments in which Norway spruce, silver fir, Douglas fir [*Pseudotsuga taxifolia*] and Scots pine were successfully infested.

ROEBUCK (A.). **Poultry in Orchards. Their Relation to Insect Pests.**—*Poultryman*, i, no. 2, pp. 63–67, 2 figs. Newport, Salop, November 1924.

The value of poultry in the orchard for the purposes of insect destruction and production of manure has been tested, and a list is given of insects that were readily eaten by fowls at various times of the year. Most of the ordinary fruit pests were eaten, though the apple blossom weevil [*Anthonomus pomorum*, L.] and the gooseberry or currant sawfly [*Pteronus ribesii*, Scop.] were refused.

MASSEE (A. M.). **The Control of the Apple Blossom Weevil** (*Anthonomus pomorum*, **L., Curt.**).—*Jl. Pomology & Hortic. Sci.*, iv, no. 1, reprint, 14 pp., 2 graphs. [London, 1924.]

Various remedies have been tried in a series of experiments, begun in 1921, for the control of *Anthonomus pomorum*, L. (apple blossom weevil). Poultry were found to be practically useless in this connection, as they do not readily take the weevils as food; they were very effective, however, in controlling *Phyllobius oblongus*, L. (leaf-eating weevil), and are said to be useful also in devouring *Otiorrhynchus picipes*, F. (raspberry weevil), which does much harm to buds of apple and pear. Grease banding, although tried in three series of experiments, gave unsatisfactory results. Mere jarring of the trees is of little use to dislodge the weevils, owing to their habit of piercing the leaf with the rostrum and thus maintaining a firm hold; severe shaking is necessary to make them fall. On trees that were sprayed with lime before blossoming, weevils have been found thoroughly coated in lime but still fully active three weeks or a month after the treatment, and even three months later lime-coated weevils were still distinguishable. Lime washing may nevertheless be worth doing as a general late dormant cleansing wash where trees are old, neglected or abounding

in crevices suitable for hibernation. After a spray with lead arsenate just before the blossoms opened, the weevils remained alive on the trees and did not fall to the ground; it is not quite clear why an efficient application of lead arsenate should fail to give better results. Unexpectedly good success was obtained from the use of sacking bands to trap the weevils. Observations of the numbers of weevils caught in the bands throughout three years show that about one month after oviposition there is a general impulse to seek rest; June and July constantly show the maximum numbers collected, and therefore bands should be applied by the end of May, and should be left on, if possible, until December or January. The trapped weevils showed an almost equal proportion of males and females, and it was found by experiments that all the females taken in the bands in June and July were capable of oviposition the following year. The methods of manipulating the bands are discussed; as the weevils enter them from above and below, a double thickness of sacking tied round the middle gave the best results. Bands placed with the lower edge about 12 inches above ground level collected many more weevils than those placed near the ground, probably owing to their remaining dry. Paper bands were of very little use. If the sacking is to be used for a second season, it should be thrown into a tub of water immediately after removal, with a few stones to ensure its sinking. A film of paraffin can then be poured on the surface of the water and this will kill the weevils. Many other insects were incidentally trapped by the bands, including *Anuraphis roseus*, Baker, Syrphid larvae, *Otiorrhynchus picipes*, F., and some weevils closely allied to *A. pomorum*, such as *A. cinctus*, Koll., *A. rubi*, Hbst., and a small species that may prove to be *A. humeralis*, Panz. (*incurvus*, Panz.), well known on the Continent, but apparently not noticed in Great Britain since 1869.

The amount of parasitism among weevils in the larval stage was slight. Of 5,000 capped blossoms, over 90 per cent. produced weevils, and only 5 parasites (*Pimpla* sp.) were observed.

Schulz (U. K. T.). **Zur Kenntnis des Apfelbaumschädlings *Anthonomus pomorum*, L.** [Contribution to Knowledge of the Apple-tree Pest, *A. pomorum*, L.]—*Zool. Jahrb.*, Abt. Syst., xlviii, no. 3–4, pp. 217–298, 1 pl., 14 figs. Jena, 1924.

Anthonomus pomorum, L., is found throughout Europe wherever apple and pear trees are grown, and also in the United States. The damage it does is of three kinds, that due to the spring-feeding of the hibernated beetles, which bore in the swelling buds, destroying the styles and pollen vessels, that caused by the larvae feeding inside the flower buds, and the destruction of the leaves by the newly emerged beetles.

In the spring the adults that have hibernated lay their eggs singly in the flower buds, each female probably laying 20–50 eggs, which hatch in about 8 days. The larvae feed inside the buds for 2–3 weeks; and pupation takes place in the bud, the pupal stage lasting 8–10 days. The newly emerged adults feed chiefly on the underside of the leaves.

Recorded parasites of *A. pomorum* are *Pimpla pomorum*, Rtzb., *P. examinator*, F., *P. holmgreni*, Schmdk., *P. sagax*, Htg., *P. nucum*, Rtzb., *Campoplex latris*, Rtzb., *Microgaster impurus*, Nees, and *Bracon regularis*, Wesm., which is very effective in France, and possibly, *M. albipennis*, Nees, *Chrysolampus aeneus*, Spin., and *Phromatus*

saxesenii, Swed. Remedial measures consist of scraping the bark from the trees in autumn and painting with a 20 per cent. fruit tree carbolineum, collecting and destroying the infested buds where possible in the case of dwarf trees, and banding the trees with an adhesive at the latest by the middle of June. Details of the morphology and anatomy of the various stages of this weevil are also given.

Reh (L.). **Die neuere Entwicklung der Schädlingsbekämpfung in Deutschland.** [The Modern Development of Insect Pest Control in Germany.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 16–19. Berlin, 1924.

Though many new insecticides are being put on the market, none of them seems to surpass the more important of the old ones. Except in the case of nicotine, the action of these old insecticides is as yet known only empirically. While biological measures are often of indisputable value, their action depends on factors independent of human control, so that careful experiments should be made before recommending them. A similar caution is advisable in the question of the immunity of certain varieties of plants from infestation.

The author protests against the technical advice of economic entomologists on the subject of insecticides being vetoed by the medical service on the ground that this or that substance is poisonous.

Stellwaag (F.). **Was erwartet die Landwirtschaft von der angewandten Entomologie?** [What does Agriculture expect of Applied Entomology?]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 19–25. Berlin, 1924.

This is a review of the scope and responsibilities of applied entomology in Germany. It is considered of great importance that, so far as possible, the direction of control measures should be free from government interference.

Müller (A.). **Zur inneren Therapie der Pflanzen.** [The internal Treatment of Plants.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 26–33. Berlin, 1924.

The success with which internal curative methods are used in medicine has suggested the possibility of treating plants in the same way to protect them for a short period from insect infestation. A brief review is given of the experiments that have been made on this subject, chiefly by American and Russian workers. The author's own investigations endeavoured to ascertain the toxic and harmless doses of various chemicals. He stood twigs of lilac in solutions of various chemicals (copper sulphate, sulphuric acid, phenol, formic acid, etc.) until the twigs had absorbed at least 75 and not more than 100 per cent. of their weight of the fluid. A table is given showing the concentrations that proved harmless. It was found that it is not a matter of proportion between the amount of the chemical and the weight of the plant, but one of the strength of the solution employed. By this method stems of *Vicia faba* were cleared of Aphids by a solution of pyridin. A further step must be the determination of the action of a series of chemicals on insect pests and their food-plants.

Börner (L.). **Das Problem der Reblausarten.** [The Problem of the Species of *Phylloxera*.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, p. 33. Berlin, 1924.

The author acknowledges that the morphological differences in the 3rd thoracic segment of his races of *Phylloxera* [*R.A.E.*, A, xii, 556] are not constant, but maintains that the biological differences remain.

Wülker (G.). **Arsenmittel im Forstschutz.** [Arsenicals in Forest Protection.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 33–44. Berlin, 1924.

The author has investigated the use of arsenicals, particularly in the form of dusts, on forest pests. He concludes that dusts are specially suited for forest conditions, because dusting is easy and rapid and reaches higher than spraying. They are specially valuable at the beginning of an infestation, while it is localised. If an outbreak is already in progress, they may be used to protect young and valuable plantations. Dusting should be carried out throughout a plantation about every fortnight during the period of attack, or in the case of such insects as *Hylobius abietis*, the material used in traps may be treated with the poison. Too much must not be expected, however, in the case of exceptionally severe outbreaks. The radius of action of arsenicals can be increased by dusting from aeroplanes, as has been done in the United States.

Dingler (M.). **Zur Generationsfrage des** *Hylobius abietis*. [The Question of the Number of Annual Generations of *H. abietis*.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, p. 45. Berlin, 1924.

A two-year generation has been generally assumed in the case of *Hylobius abietis*, but instances have been observed of one hibernation only, in the young adult stage, instead of a larval hibernation followed the next winter by an adult hibernation. By subjecting larvae in their pupal cells to a temperature of 25° C. [77° F.], pupation can be advanced, and young adults emerge after a pupal period of normal length. These results warrant the view that it is abnormal temperatures that lead to the one-year generation, and corroborative evidence is available from data obtained in nature after an unusually warm summer.

Zacher (F.). **Methoden der Vorratsschädlingsbekämpfung.** [Methods for the Control of Pests of Stored Products.]— *Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 45–50. Berlin, 1924.

Besides such mechanical measures as sweeping, the application of heat and cold, electricity (as instanced by the use of X-rays in Mexico to destroy *Lasioderma serricorne* in boxes of cigars), and the occasional employment of poison-baits, fumigation is the principal method of combating insect pests in warehouses, etc. The author has endeavoured to use a combination of gases, one to act as an irritant and the other as a poison. A mixture of carbon dioxide and glacial acetic acid is a

satisfactory example of such a combination, promising results of practical value, though carbon dioxide alone proved ineffective. The whole subject, however, needs much further research.

HEERDT (W.). **Zyklon B, ein verbessertes Blausäureverfahren.** [Zyklon B, an improved Method of using Hydrocyanic Acid Gas.]—*Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 81–83, 2 figs. Berlin, 1924.

Since the author last drew attention to the derivatives of hydrocyanic acid gas [*R.A.E.*, A, xi, 130], further improvements have been made in "Zyklon." Success has attended its use in all cases. One practical point is that the total weight and bulk of the apparatus and material is only about one-quarter that used in fumigation by hydrocyanic acid gas with buckets.

ANDRES (A.). *Podagrica fusciformis*, **der Malvenflohkäfer.** [Mallow Flea-beetle.]—*Verh. Deutsch. Ges. angew. Ent., 4. Mitgliederversamml. Frankfurt a. M. 10. bis 13. Juli 1924*, pp. 85–86. Berlin, 1924.

A half-acre plot of rose-mallow [*Althaea rosea*] belonging to a grower of medicinal plants was severely attacked by the mallow flea-beetle, *Podagrica fusciformis* [sic, ? *fuscicornis*, L.], which had apparently been unnoticed in the preceding years. The larva lives in the stem of the plant and pupates in the ground.

MÜLLER (K.), MUTH (F.) & STELLWAAG (F.). **Die Reblausgefahr für den deutschen Weinbau.** [The Danger of *Phylloxera* to German Viticulture.]—*Wein u. Kellerwirtschaft*, iii, no. 18, reprint, 14 pp., 4 figs. Freiburg i. Br., 1924.

This pamphlet briefly discusses the *Phylloxera* problem, the German regulations relating to it, and the measures for substituting resistant stocks in infested vineyards.

OLDENBERG (L.). **Die bei** *Eriopeltis lichtensteini* **schmarotzende** *Leucopis* **(Dipt.).** [The *Leucopis* parasitic on *E. lichtensteini*.]—*Deutsche Ent. Zeitschr.*, 1924, pt. 5, pp. 448–450. Berlin, 30th November 1924.

The parasite of *Eriopeltis lichtensteini*, Sign., on various grasses such as *Festuca* and *Calamagrostis* in Germany, etc., known throughout the literature as *Leucopis nigricornis*, Egger, does not agree with the original description of this species and is considered by the author to be *L. annulipes*, Zett. Specimens were sent to England for confirmation and proved to be identical with *L. annulipes* bred in England from Coccids on *Festuca*.

MÜTZE (L.). *Tortrix viridana* **L.**—*Internat. Ent. Zeitschr.*, xviii, no. 33, p. 203. Guben, 8th December 1924.

Tortrix viridana, L., occurred in unusual abundance in the vicinity of Gotha during 1924. Large numbers were destroyed by natural enemies. The larvae of *Taeniocampa incerta*, Hfn., were observed to devour numbers of the larvae and pupae, while those of another

Noctuid, *Calymnia trapezina*, L., are thought to do so also. The predacious beetles, *Calosoma inquisitor*, L., and *Silpha quadripunctata*, L., were present in numbers.

Uffeln (K.). **Nochmals** *Tortrix viridana* **L.** [Again *T. viridana.*]—*Internat. Ent. Zeitschr.*, xviii, nos. 35 & 36, pp. 213–215 & 217. Guben, 22nd December 1924 & 1st January 1925.

In view of the preceding paper the author briefly reviews the occurrence of *Tortrix viridana*, L., in Westphalia. Severe outbreaks occurred from 1907 to 1912, since when, though still occurring in sufficient numbers to necessitate the felling of many trees, the pest has been slightly less abundant. The greatest damage is done in the low-lying plains, apparently owing to the greater amount of shelter offered in such positions, and this is probably also the reason why isolated trees or those on the edge of a forest suffer less than the others. Notes are given on the biology of this moth, as observed in Westphalia, where there has never apparently been more than one generation a year, and on the natural enemies as recorded by other authors.

Schwartz (—). **Der Koloradokäfer in Frankreich.** [The Colorado Beetle in France.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, v, no. 1, pp. 1–3. Berlin, 1st January 1925.

This review of the situation with regard to the Colorado potato beetle [*Leptinotarsa decemlineata*] in France is compiled from French publications already noticed.

Dyckerhoff (F.). **Ueber die Beobachtungen an der Rübenblattwanze (*Piesma quadrata* Fieb.) und anderen Arten der Gattung** *Piesma* **im Jahre 1924.** [On the Observations made in 1924 on the Beet Leaf Bug, *Zosmenus quadratus*, and other Species of the Genus *Zosmenus*.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, v, no. 1, pp. 3–4. Berlin, 1st January 1925.

In 1924 it was definitely established that *Zosmenus* (*Piesma*) *quadratus*, Fieb., is the only species of the genus injurious to beet in Anhalt [*R.A.E.*, A, xii, 438]. Winter wheat and winter rye afford hibernating quarters for this bug. The migration of *Z. quadratus*, and consequently attack by it, seems to occur over a considerable period. A second generation was noticed in 1924, but whether the late attack is chiefly due to it is uncertain. Some beet-fields remained uninfested though close to others that were severely attacked, but no reason for this is known. This also applied to individual beets. West of Aschersleben *Z. quadratus* occurred on *Atriplex* and did not attack beet, this being in direct contrast to its behaviour in Anhalt. *Z.* (*P.*) *maculatus* as well as *Z.* (*P.*) *capitatus*, Wolff, and *Z.* (*P.*) *anticus*, Steph., occur on *Atriplex*, but have not been found on beet.

Gasow (H.). **Eine neue biologische Grundlage für Versuche zur Bekämpfung des Kiefernknospentriebwicklers (*Evetria buoliana* Schiff).** [A new biological Basis for Experiments in combating the Pine Shoot Moth, *Rhyacionia buoliana*.]—*Nachrichtenbl. deutsch. Pflanzenschutzdienst*, v, no. 1, p. 5. Berlin, 1st January 1925.

The use of an insecticide against the pine shoot moth, *Rhyacionia* (*Evetria*) *buoliana*, Schiff., is possible in the egg-stage only. The eggs,

which are described for the first time, are laid without any covering on the surface of the buds. A contact insecticide is therefore suitable for use against them. Owing to the long period of oviposition such a spray must be applied twice—in the 2nd and 4th weeks of July in Germany ; consequently this method is not feasible where large areas are involved.

DE VIN (T. J.). **Bestrijding van de kersenbladluis en de Monilia-ziekte in de zwarte kersen.** [Measures against the Cherry Aphis and Monilia Disease in Black Cherries.]—*Tidjschr. Plantenziekten*, xxx, no. 12, pp. 240–243. Wageningen, December 1924.

A 7 per cent. spray of carbolineum, applied in January and February, has been found effective in Holland against the cherry aphis [*Myzus cerasi*]. An infection of the trees by *Monilia* stopped after the spraying, but as the spores were not killed, it is not certain whether this was accidental or whether the Aphids favour the development of the fungus. The cost of spraying was only a fraction of the value of the crop saved.

FAES (H.) & TONDUZ (P.). **Rapport Annuel—1923. Station fédérale d'essais viticoles à Lausanne et domaine de Pully. A. Division de physiologie et pathologie végétale.**—*Ann. agric. Suisse*, xxv, no. 4, pp. 383–390. Bern, 1924.

In regions where all hope of exterminating *Phylloxera* has been abandoned, cultural treatment, with weak doses of carbon bisulphide, will sometimes prolong the life of infested vines. Plantations of locally grown *Pyrethrum* have produced several thousands of kilogrammes of flowers for use against the vine moths [*Clysia ambiguella* and *Polychrosis botrana*]. The proper use of arsenicals against fruit pests is discussed [*R.A.E.*, A, xii, 107]. The efficacy of lead arsenate against *Neurotoma* (*Lyda*) *nemoralis* on apricots has been proved [*R.A.E.*, A, xi, 529] ; in a normal season, arsenical treatment should be given at the end of April or beginning of May, to leave as long a period as possible before gathering the crop. Equally good results can be obtained with contact insecticides of 2 per cent. soft soap solution with the addition of 1 per cent. of titrated nicotine or concentrated tobacco extract ; or with 1 part pyrethrum-soap to 6 parts water ; these should be applied somewhat later, as soon as all the larvae of *N. nemoralis* have hatched. The action of various soil fumigants on mole crickets (*Gryllotalpa*) and larvae of *Melolontha melolontha* is discussed, as well as the effect of low temperatures [*R.A.E.*, A, xi, 386] on the latter. The fumes of carbon bisulphide have a marked effect on *Melolontha*, provided that the concentration and time of exposure are sufficient, but hydrocyanic acid gas and chloropicrin are more rapid and complete in their action.

Other pests recorded in 1923 on various fruits were *Cheimatobia brumata*, *Malacosoma* (*Bombyx*) *neustria*, *Zeuzera pyrina*, *Hyponomeuta* spp., and *Xyleborus dispar*.

RAMBOUSEK (F.). **Motýlové na řepě cukrové.** [Moths on Sugar Beet.]—*Ochrana Rostlin*, iv, nos. 2–3 & 6, pp. 29–35 & 81–87, 26 figs. Prague, May & December 1924.

The moths attacking sugar-beet are listed, with brief biological notes on each species ; they comprise *Agrotis pronuba*, L., *Euxoa* (*A.*)

segetum, Schiff., *Scotogramma* (*Mamestra*) *trifolii*, Rottb., *Calocampa exoleta*, L., *Polia suasa*, Schiff. (*Mamestra dissimilis*, Knoch), *P.* (*M.*) *oleracea*, L., *Brotolomia meticulosa*, L., *Laphygma* (*Caradrina*) *exigua*, Hb., *Phytometra* (*Plusia*) *gamma*, L., *Phthorimaea* (*Lita*) *ocellatella*, Boyd, *Cnephasia wahlbomiana*, L., and *Plutella maculipennis*, Curt.

BLATTNÝ (C.). **Opět o puklici švestkové** (*Lecanium corni* **Beleé**). [Notes on *Eulecanium corni*, Bch.]—*Ochrana Rostlin*, iv, no. 6, pp. 88–90, 1 map. Prague, December 1924.

Eulecanium (*Lecanium*) *corni*, Bch., chiefly attacks plums in Czecho-Slovakia, though it may be also found on gooseberries and red currants. The extent of the infestation throughout the country is discussed; in this connection the planting of *Robinia pseudacacia* appears to be one of the chief means of introducing the pest into fresh localities. The local seasonal history is described.

The remedial measures recommended include spraying with carbolineum, kainit and tobacco extracts, special attention being drawn to the necessity of clean cultivation throughout the orchards. A spray calendar is given.

ZIMMERMANN (F.). **Mol azalkový** (*Gracilaria azaleella* **Brants**).—*Ochrana Rostlin*, iv, no. 6, pp. 90–92. Prague, December 1924.

Gracilaria azaleella, Brants [*cf. R.A.E.*, A, xii, 542] is causing considerable injury to azaleas grown on a commercial scale in Czecho-Slovakia. Plants previously imported from Dresden were heavily infested. The eggs are laid on the lower surface of the leaves, where apparently pupation also occurs. The local seasonal history at Dresden is described, where there are 2 generations a year.

ZOLK (K.). **Mönda uuemat tumeda viljanaksuri** (*Agriotes obscurus* **L.**) **bioloogiast.** [Some new Data on the Biology of *A. obscurus*.]—*Tartu Ülikooli Entomoloogia- katsejaama teadaanded*, no. 4, 12 pp., 4 figs. Tartu, November 1924. (With a Summary in German.)

Agriotes obscurus, L., is a serious pest in Esthonia, but no effective measure against it is available, chiefly on account of lack of knowledge regarding its biology. Beetles emerged from collected pupae on 21st and 22nd August, but as they did not feed and the ovaries remained undeveloped, it is presumed that mating and oviposition do not take place till the spring. In the open, it was not until the end of May that some adults were seen, and large numbers only appeared with warm weather early in June. Mating occurred between 4th June and 7th July, the first eggs being seen on 13th June. Oviposition was never noticed by day. A moderate amount of moisture is necessary, and eggs do not develop in dry soil. The first larvae appeared on 28th July. The author suggests that the egg-stage should be chosen for remedial measures, and that the fields should be repeatedly worked between mid-June and mid-July in order to prevent the eggs from developing. If this ploughing is done against the pupae, the pupae of *Paracodrus apterogynus* will also be destroyed and the aid afforded by this parasite will be lost.

Zolk (K.). *Paracodrus apterogynus* **Halid. bioloogia kohta.** [The Biology of *P. apterogynus*.]—*Tartu Ülikooli Entomoloogia-katsejaama teadaanded*, no. 5, 10 pp., 6 figs. Tartu, November 1924. (With a Summary in German.)

In 1924 work was continued on *Paracodrus apterogynus*, Halid., the Proctotrupid parasite of *Agriotes obscurus*, L. [*R. A. E.*, A, xii, 434] in Esthonia.

Most of the parasites are infected and finally killed by a fungus. Parasitised wireworms reacted to touch, but were incapable of locomotion. The parasite spends 16–18 days in the pupal stage. Each female contains about 170 eggs, and probably oviposits in more than one wireworm, as only 14–52 parasites were found in the wireworms examined.

Spessivtseff (P.). **Grankottmätarna och deras skadegörelse.** [The Spruce Cone Geometrids and the Injury they do.]—*Medd. Stat. Skogsförsöksanst.*, xxi, no. 7, pp. 295–310, 14 figs. Stockholm, 1924. (With a Summary in German.)

The Geometrids, *Eupithecia abietaria*, Götze, and *E. strobilata*, Hb., are overlooked in the text-books of forest entomology, although their larvae cause serious losses by attacking the cones of spruce. This is due partly to the damage they do being ascribed to another species, *Dioryctria abietella*, Schiff., which has a somewhat similar biology, and also to confusion regarding their specific names and synonymy. The results of the author's recent investigations in Sweden are given. The characters differentiating these moths in the adult and larval stages are described; the pupae are scarcely distinguishable. In Central Sweden in 1924 some of the cones of nearly every spruce were attacked by the larvae of *E. strobilata*, the infestation being recognisable by the excreta. From 20 to 30 larvae occurred in each infested cone. From the first traces of larval injury it appears that only one egg is laid on a given scale of the cone. The larva feeds on this scale, and after moulting it bores through it to the one below and then attacks the next ones. The mature larva feeds on the juicy, thick, basal parts of the scales, and if juicy seeds are met with they, too, are eaten, but only incidentally. Finally the infested cone withers and usually falls without maturing the seeds. The larvae reach full growth about a month after hatching. The first pupae were seen in mid-August, but most of the larvae pupated between the end of August and mid-September. Pupation takes place in a loose cocoon, covered with larval excreta, and usually outside the fallen cone, but sometimes between the scales of such cones as have remained on the tree. It has been suggested that *E. strobilata* oviposits on the galls of *Chermes* spp. and rarely uses spruce cones, but the author's observations are opposed to this. Though he found galls with larvae of this species, they were very few compared with infested cones. The early adults seem to oviposit on galls. Pupation occurred outside the galls, often on the branch near by.

E. abietaria appears in numbers and oviposits about 7–10 days later than the preceding species, and it was only towards the end of July and in early August that cones infested by it were found. Usually 2–4 larvae occur in a cone, and corresponding with this the excreta are seen in 2–4 small heaps on the cone. These heaps are small and

thus differentiated from the large masses found in the case of the larvae of *Dioryctria abietella*. The larval injury is similar to that of *E. strobilata*, but the larva does not remain long on the first scale attached; soon after hatching it bores through to the scale beneath. Pupation is similar, but occurs about 1½ weeks later. In the case of *E. abietaria* the duration of the pupal period has been observed; it lasts about 2 years.

Both species are found in spruce forests in Europe and Siberia. *E. abietaria* is as widespread in Sweden as *D. abietella*, and this is probably also true of *E. strobilata*. Examination of 400 injured cones showed 46 per cent. to be infested by both species of *Eupithecia*; 57 per cent. by the hitherto undescribed larvae of a fly; and 62 per cent. by the larvae of *Cydia* (*Grapholitha*) *strobilella*, Hb.

[Mordvilko (A. K.).] **Мордвилко (А. К.). Кровяная тля биология и распространение.** [*Eriosoma lanigerum*, Hausm., Biology and Distribution.]—**Новая Деревня** [*New Village*], 110 pp., 4 pls. Leningrad, 1924. (With a Summary in German.)

The author's abstract of this paper has already been noticed [*R. A. E.*, A, xi, 142]. The history of the occurrence of *Eriosoma lanigerum*, Hausm., in Europe is traced, the information being taken from a review of existing literature and the author's observations. Keys are given to the genera of the Eriosomea and to the species of *Eriosoma*, *Tetraneura*, and *Colopha*. The distribution of the Eriosomea in general is discussed, and a detailed account is given of the anatomy, morphology, cyclical development and bionomics of *E. lanigerum*. Notes on other species of *Eriosoma* are included with a discussion of the evolution of migration in this genus and its allies [*cf. R. A. E.*, A, xi, 563].

[Znamenski (A. V.).] **Знаменский (А. В.). Значение хозяйственных и климатических условий для массового размножения гессенской и шведской мух в 1923 г. и перспективы на 1924 год.** [The Relation of Agricultural and Climatic Conditions to Mass Development of the Hessian and Frit Flies in 1923 and the Prospects for 1924.]—**Полтавск. С.-Х. Опытн. Станция Энт. Отдел** [*Poltava Agric. Expt. Sta., Ent. Dept.*], Bull. 3, 27 pp., 7 figs. Kharkov, 1924.

The extent of infestation by the Hessian fly [*Mayetiola destructor*, Say] and the frit fly [*Oscinella frit*, L.] in various localities of the Ukraine during 1923 is discussed from the point of view of agricultural practices and climatic conditions. The infestation is expected to increase in 1924, the spread being chiefly northwards.

[Bei-Bienko (G.).] **Бей-Биенко (Г.). Материалы к биологии непарного шелкопряда (*Lymantria dispar*, L.) на Алтае.** [Notes on the Biology of *Porthetria dispar*, L. on the Altai Mountains.]—**Труды Сиб. С. Х. Акад.** [*Proc. Siberian Agric. Acad.*], iii, pp. 155–160. Omsk, 1924.

Porthetria (*Lymantria*) *dispar* causes considerable damage to many forest trees in the Altai mountains, where, owing to great variations in climate and altitude, slight differences occur in the forms and habits of the moth. Thus in some localities the eggs are largely laid in the

rock crevices. The food-plants include *Caragana arborescens*, raspberry (*Rubus idaeus*), hops (*Humulus lupulus*), and *Filipendula ulmaria*. A large number of the larvae and pupae were parasitised by Diptera, including *Echinomyia fera*, L., and probably *E. magnicornis*, Zett.

[Moritz (L.).] **Мориц (Л.). Отчет по борьбе с массовыми вредителями сельского хозяйства в 1922-23 и в 1923-24 операционных годах.** [Report on the Control of Outbreaks of Agricultural Pests during 1922–24.]—**Наркомзем Туркреспублики, Озра** [*Nat. Commissar. Agric. Turkestan Republic, Dept. Plant Prot.*], 22 pp., 6 figs. Tashkent, 1924. (In Russian and Sart.)

The organisation of campaigns against agricultural pests including locusts in the various districts of Turkestan is discussed. The plan of working and the expenditure entailed are described.

[Nikolski (V. V.).] **Никольский (В. В.). Азиатская Саранча *Locusta migratoria* L.** [The Asiatic Locust.]—**Государственный Инст. Опытной Агрон. Труды Отдела Прикл. Энтом.** [*State Inst. Exptl. Agron., Trans. Dept. App. Ent.*], xii, no. 2, 330 pp., 37 figs. Leningrad, 1925.*

This book presents a complete monograph of *Locusta migratoria*, L., in Russia, from the bionomic and economic points of view, and is a result of many years of original observations by the author in Turkestan, together with a survey of literature on the subject.

The first part includes a general account of the economic importance of *Locusta migratoria*, its distribution and systematics. A very detailed survey of all its known more or less permanent breeding-grounds is given, with a history of the appearance of locusts in each of them; and a special short chapter deals with their ecological conditions. A similar survey of the temporary and accidental breeding-places is appended.

The second part deals with bionomics. All stages of development are very fully described and figured, with numerous observations on the procedure and conditions of hatching, moulting, etc. The behaviour of larvae and of larval swarms is discussed at great length, and a very large number of original observations on the influence of environment (especially temperature) on larval movements are fully recorded. The author's conclusions on this point are not quite definite, since he does not consider the evidence sufficient; but he is inclined to think that the principal factors of the larval movements are their positive thermotropism and positive phototropism, while the actual stimulus to wander is an inherent instinct useful for the preservation of the species, and that the larval movements cannot, therefore, be explained by reactions to environment alone.

The chapter on the food of this locust states that the insects, in all stages, feed almost exclusively on graminaceous plants, their staple food being *Phragmites communis*. Attacks on non-graminaceous plants may in many cases be attributed to want of moisture, not of food.

A special chapter devoted to the migrations of adult swarms begins with a review of all existing theories of migrations. The author's observations in Turkestan lead him to the conclusion that migrations

* Actually published in December 1924.

usually take place between separate permanent breeding-grounds which constitute definite systems ; the locust, as a swarming insect, can survive only when none of the individual breeding-places of the given system are rendered uninhabitable for locusts by cultivation ; if this happens, the whole system becomes disturbed, and the locusts in it will sooner or later die out. The fact, frequently recorded in the literature, of locust swarms leaving their breeding-grounds and migrating into entirely unfavourable localities are considered to prove that those localities used formerly to be of a kind suitable for breeding and formed parts of a system, but that their natural conditions have been altered by cultivation. Migrations of locusts from one breeding-ground in a system to another are explained as an adaptation preventing the species from being destroyed by its parasites. These become very numerous after the locusts have been breeding in a certain place for several years, but are left behind and die out when a migration to a fresh, non-infested breeding-ground takes place. Uvarov's theory [*R. A. E.*, A, ix, 561] of the migrations and periodicity of locusts as a result of the alternation of two " phases " is admitted for the systems that are on their way to dying out owing to some of the breeding-grounds belonging to the system being destroyed. The physiological explanation of the actual migratory flights proposed by Uvarov seems inadequate to the author, who admits the importance of this aspect, but insists on the study of the problem from the point of view of the evolution of the instincts of preservation in the species.

The parasites of the Asiatic locust are discussed very briefly. Egg-masses are subject to attacks by some species of *Zonabris*, which are not listed, *Epicauta erythrocephala*, Pall., *Anastoechus nitidulus*, F., *Systoechus autumnalis*, Pall., and *Scelio* sp. Both larvae and adult locusts are parasitised by larvae of *Blaesoxipha lineata*, Fall., *B. erythrura*, Meig., and *Disjunctio balassogloi*, Portsch. The mite, *Trombidium debilipes*, Leonardi, preys on locust eggs in its adult stage, and its larva is an external parasite of locusts. Amongst birds, the most active enemies of locusts are rooks (*Corvus frugilegus*) and rosy starlings (*Pastor roseus*).

The third part of the book deals with control, and gives a historical survey of methods with a description of those used at present ; both the technique and the organisation of control are discussed very fully.

An appendix includes a discussion on the possibility of using aeroplanes against locusts and translations of some recently noticed papers on locusts [*R. A. E.*, A, xi, 251, 507]. The conclusion is arrived at that there is great need of biological research on locusts, especially from the point of view of the theory of phases. A bibliography of the papers quoted is given ; it includes 137 papers, mainly in Russian.

This work should be of great value to all students of locusts, being, as it is, the only full monograph of a species of locust published in recent times.

WEBSTER (J. F.). [Report.]—*Mthly. Agric. Bull. Iraq, 16th Oct.–15th Nov. 1924.* 2 pp. Baghdad, 23rd November 1924.

An anti-locust campaign is being undertaken at Mosul, where the insects have been entirely uncontrolled during recent years and are spreading to an alarming extent. An investigation is also being made into the hibernating places of *Eurygaster integriceps*, a pest of sunn [*Crotalaria juncea*]. This bug is increasing in activity, and it is

thought that its hibernation quarters must be in the inaccessible mountain regions of the north. A Phyllocnistid leaf-miner and the citrus butterfly, *Papilio demoleus*, have been intercepted on citrus fruit; both are highly dangerous pests not as yet found in Iraq but common in India.

KANNAN (K. K.). **A Serious Pest of Cardamoms.**—*Jl. Mysore Agric. & Exptl. Union*, vi, no. 2–3, pp. 81–83. Bangalore, 1924.

A great deal of damage is being caused to cardamoms in Mysore by the larvae of a moth resembling *Eupterote minor* in its habits. Though the identity of this pest has not yet been established, it occurred in such large numbers that various remedial measures had to be tried. The caterpillars apparently originate in the forest, where they defoliate practically every tree and then descend by long threads on to cardamoms, of which they strip the leaves to the midribs. They feed at night and during the day congregate in masses on the trunks of the trees, in the hollows of decayed logs or other shelters. At this time they might be burnt off with torches, other methods being the application of strong kerosene emulsion or dusting with cyanide powder mixed with chalk or any other fine carrier. These methods are only practicable when the invasion is a limited one. It is possible that thinning out the shade above the cardamoms may make the latter less attractive owing to the greater heat and light thus admitted.

Ceylon : Plant Protection Ordinance, No. 10 of 1924. 7 pp. Colombo, 27th June 1924.

This Ordinance repeals the Insect Pest and Quarantine (Amendment) Ordinance, No. 30 of 1919, and previous ones.

Regulations contained in a schedule to it prohibit the introduction, without a permit, of any living insect or invertebrate animal, not previously known to exist in Ceylon, seeds or plants of *Hevea* from the Western Hemisphere (they may be imported from the Eastern Hemisphere with a permit), tea seed from India, coconut plants and, except through Colombo, coconuts in husk.

The regulations dealing with the importation, inspection and fumigation of living trees, plants, tubers, roots, bulbs and their containers, coconuts in husks, *Citrus* fruits and seed of *Gossypium*, notification of pests, infested areas, and treatment of plants in such areas are given.

Plant Protection Ordinance, No. 10 of 1924. Schedules, Regulations, etc.—*Ceylon Govt. Gaz.*, Nos. 7409, 7413, 7425, 7427, 7431. Colombo, 8th August–21st November 1924.

A schedule is given of the countries whose service of plant inspection is recognised for the requirements of the Ordinance.

The shot-hole borer of tea (*Xyleborus fornicatus*, Eich.); *Oryctes rhinoceros*, L., *Rhynchophorus ferrugineus*, F., and *Nephantis serinopa*, Meyr., on coconuts; and *Cosmopolites sordidus*, Germ., and *Odoiporus longicollis*, Oliv., on bananas; are declared pests under the Ordinance.

To prevent the spread of *X. fornicatus*, no tea plants or parts of them, except tea seed or leaf for manufacture, may be removed from

any plantation without a permit, except for scientific investigation. All tea plants transported must be packed in clearly marked containers. All coconut leaves attacked by the coconut caterpillar (*Nephantis serinopa*, Meyr.) must be cut off and burned within twelve hours of cutting.

All living coconut palms attacked by *R. ferrugineus* must be either uprooted and burned, or kept completely submerged in water, or the part of the palm which is attacked cut out and destroyed and the cavity filled with mortar or similar material. To prevent its spread all dead coconut palms must be similarly burned, or kept submerged. This precaution is also necessary to prevent the spread of *O. rhinoceros*. Moreover, dead coconut stems, except when used for building, and rubbish heaps, etc., that might encourage the spread of *O. rhinoceros* must not be kept on any land, and accumulations of dung or vegetable refuse must not be kept longer than four months unless in a manure pit.

Lists are given of the areas declared infested with *X. fornicatus*, *O. rhinoceros*, *R. ferrugineus*, and *N. serinopa*.

FURTADO (C. X.). **A Study of the Coconut Flower and its Relation to Fruit Production.**—*Gardens' Bull. Straits Settlements*, iii, no. 7–8, pp. 261–274. Singapore, 7th November 1924.

Insects appear to play an unimportant part in the cross-pollination of coconut flowers in the Malay Peninsula, though this is apparently not the case in other countries. Opinions vary with regard to the value of ants. The more important insects connected with cross-pollination in Singapore are *Melipona* sp., *Apis dorsata*, a species of *Musca* very near *M. nebulo*, *Lucilia* sp. and *Chrysomyia* (*Pycnosoma*) sp.

CORBETT (G. H.) & PONNIAH (D.). **"Red Stripe" Weevil of Coconuts** (*Rhynchophorus schach*, **Oliv.**).—*Dept. Agric. S. S. & F. M. S.*, Bull. 36, 51 pp., 6 pls. Kuala Lumpur, 1924.

The bulk of the information here given has already been noticed from a shorter paper [*R. A. E.*, A, xi, 389]. In the present bulletin full details are given of the various experiments from which the conclusions were drawn, and the different stages are described.

The following insects are mentioned as being capable of producing conditions suitable for *Rhynchophorus schach*, Ol., to lay eggs in coconut and other palms: *Diocalandra frumenti*, F. (manila beetle), only of importance to coconut palms from this point of view; *Trochorrhopalus strangulatus*, Gyl., found on coconut (*Cocos nucifera*), *Elaeis guineënsis*, *Oncosperma tigillaria*, *Areca catechu* and *Metroxylon sagu*, especially after the trees have been damaged; *Coptotermes* (*Termes*) *gestroi*, Wasm.; *Oryctes rhinoceros*, L.; and *Xylotrupes gideon*, L.

REBEL (H.). **Einige Lepidopteren als Tabakschädlinge auf Sumatra.** [Some Lepidoptera injuring Tobacco in Sumatra.]—*Verh. Zool.-bot. Ges. Wien*, lxxiii (1923), pp. (73)–(75). Vienna, 1924.

Lepidopterous pests of tobacco in Sumatra sent by Dr. L. Fulmek are noticed. The species recorded by him as *Dausara talliusalis*, Wlk. [*R. A. E.*, A, xi, 466] is a new species, described here as *Pachyzancla ambitalis*.

MENZEL (R.). **Over spinnen- en sluipwespen-cocons en een parasiet der cacao-***Helopeltis*. [Notes on Cocoons of Spiders and Hymenopterous Parasites and on a Parasite of the *Helopeltis* of Cacao.]—*De Thee*, v, no. 3, pp. 72–75, 1 pl. Buitenzorg, September 1924. [Received 29th December 1924.]

A Chalcid, probably of the genus *Tetrastichodes*, has been bred from the cocoons of spiders on tea; it does not seem to be a parasite of *Helopeltis*, as is possibly the case with a Braconid, probably of the genus *Euphorus*, the cocoons of which occur on tea.

LEEFMANS (S.). **Een gevaarlijke klapperplaag in de buitenbezittingen.** [A dangerous Pest of Coconuts in the Dutch East Indies outside of Java.]—Reprint, 4 pp., dated October 1924, from *De Indische Culturen* [Buitenzorg ?].

The Tettigoniid, *Sexava coriacea*, L., severely attacks the leaves of coconuts in the Talaut Islands, where it apparently occurred on other palms until coconut cultivation was widely extended about 1889. About 95 per cent. of the eggs are laid on the ground and only about 5 per cent. on the palms, but both the larvae and adults infest the crowns of the trees. This is confirmed by banding with a local birdlime, and arrangements are being made to obtain suitable banding material by means of which it is hoped to prevent the injury.

DUPORT [L.]. **Rapport sur le fonctionnement de la Station entomologique de Cho-ganh (Tonkin) pendant le 2e semestre 1923 et le 1er semestre 1924.**—*Bull. écon. Indochine*, xxvii, Renseignements, July 1924, pp. [363]–[366]. Hanoi, 30th September 1924; also *Sta. ent. Cho-Ganh, Bull. périodique*, nos. 20 & 21, 6 pp. Hanoi, 1924.

These reports give further details of the rearing of the parasites, *Doryctes strioliger*, Kieff., and *Sclerodermus domesticus*, Kieff., for use against *Xylotrechus quadripes*, Chevr. (coffee borer) [*R. A. E.*, A, xii, 463].

SURCOUF (J. M. R.). **Sur un parasite du Cotonnier vivant aussi sur le Bersim.**—*Rev. Bot. appl. & Agric. colon.*, iv, Bull. 39, pp. 752–753. Paris, 30th November 1924.

The moth, *Prodenia litura*, F., is a menace to cotton growing in Algeria, as it breeds on adjacent berseem (*Trifolium alexandrinum*), which offers, in any state of irrigation, favourable conditions for development, and is grown in large tracts.

VUILLET (J.). **La lutte contre les Jassides parasites du Cotonnier au Soudan français.**—*Rev. Bot. appl. & Agric. colon.*, iv, Bull. 39, pp. 757–759. Paris, 30th November 1924.

Jassids are among the most dangerous of the less known pests of cotton, the chief being *Empoasca devastans* and *E. notata* in British India, and *Chlorita facialis* in South, East and West Africa. In plantations infested by Jassids, the leaves become deformed and fall, growth ceases and the plant may die. Leafroll has already been shown

to be caused by *C. facialis* in East Africa ; infested leaves become cup-shaped, and there is a close relation between the spread of bacterial rust of cotton and of mosaic disease and the increase of this insect. Colonies of *C. facialis* live on the lower surface of leaves, about the base of the principal veins. In the Niger Valley this leafhopper has been observed on cotton, castor-oil, *Hibiscus esculentus* and *Bombax ceiba* ; native cotton seems to suffer less than American or Egyptian varieties. In the French Sudan, development of the insect takes from 20 to 24 days in October, and is more rapid in the dry season ; incubation seems to require only 9 days, and the adult stage is reached in another 9 or 10. Cotton grown in manured ground remained healthy and resisted attack by *C. facialis*, and the indications are that the damage is much less severe on ground rich in mineral fertilisers, especially potash. A trial plot sprayed with 20 lb. copper sulphate, 15 lb. lime, $\frac{1}{2}$ lb. casein, and $1\frac{1}{5}$ pints of pure nicotine per 100 gals., using 165 gals. per acre, yielded 1,554 lb. of raw cotton compared with 736 to 1,457 lb. on similar untreated plots. Oil and soap emulsions were tried without much success, any strength that killed the insects in numbers injuring the foliage. Owing to the volatile nature of nicotine, the above spray has not very lasting effects, and it is hoped to repeat these experiments and also to try lead arsenate, which is more stable.

King (H. H.) & Giffard (W. E.). **The Control of Pink Bollworm (*Platyedra gossypiella*, Saunders) in the Sudan.**—*Sudan Govt. Wellcome Trop. Res. Labs.*, Ent. Sec. Bull. 21, 16 pp., 1 map. Khartoum, May 1924. [Received 18th December 1924.]

The authors' summary of this paper is as follows :—The pink bollworm, *Platyedra gossypiella*, Saund., is probably the most important of the insect pests of cotton. It is widely distributed in the Sudan, but in most districts is a minor pest, being kept in check by means of simple control measures. In certain districts, for reasons given, these measures are insufficient. Cotton is already grown to a considerable extent in the Sudan, and it is believed that very extensive areas in the rain belt, at present unexploited, will prove suited to this crop. The necessity of taking steps to ensure that the introduction of cotton growing into new regions shall be accompanied by that of measures for the effective control of pink bollworm is indicated. The control of pink bollworm lies in protection of the crop from infestation. This can be effected by :—(*a*) The destruction of the old cotton plants and refuse of the crop when the last picking has been taken, and at the same time of all other plants on which this insect can feed ; (*b*) the export from the district of all seed resulting from the crop, except such as may be required for sowing, which should be sunned or otherwise treated for the destruction of pink bollworm contained in it ; (*c*) the observance of a dead season of two months between the destruction of the remnants of the crop and the sowing of the new ; (*d*) the use of none but clean seed for sowing. Where this has been done pink bollworm has been completely controlled. The chief difficulty in getting these measures carried out lies in the fact that cultivators like to retain and store seed cotton from the tail pickings, to be ultimately ginned by hand and woven into native cloth. A method by which they shall be enabled to retain such seed-cotton, but be induced to gin it promptly and dispose of the resulting seed

before the new crop is sown, is described. Attention is directed to the need for co-operation between Government and cultivators in attempting to effect the control of cotton pests.

[Ritchie (A. H.). **Report of the Entomologist.**]—*Rept. Dept. Agric. Tanganyika Territory for 15 Months ending March 31st 1924*, pp. 20–22. London, 1924.

Compulsory measures for the control of cotton pests and diseases included uprooting and burning of plants after harvest and export or destruction of all seed remaining on completion of sowing. The latter measure was rather difficult to enforce, owing to the fact that in districts from which export is not possible certain ginneries operate for 9 to 10 months of the year, well past the sowing season of the next crop; this condition will disappear with the increase in the number of ginneries that is now taking place. A study has been made of internal boll disease of cotton, which is important, as it has a serious effect on the strength of the fibre, and a careful watch should be kept for it. It is probable that, besides the presence of cotton-stainers and of the causative fungus, conditions must be favourable for the development of the disease, and it seems likely that dull weather, causing slow opening of the bolls and damp inside them, favour it.

The chief insect pests of the year on coffee were thrips, *Antestia lineaticollis* (coffee bug) and *Anthores leuconotus*, Pasc. (white borer). Less important ones were the Bostrychid, *Apate* sp., Coccids, grasshoppers, and a root Nematode. *Nitocris usambicus*, Kolbe (yellow borer), *Leucoptera coffeella*, Guér. (except at higher altitudes), and *Stephanoderes hampei*, Ferr., were practically negligible or absent.

Anderson (T. J.). **Annual Report of the Entomologist for the Year 1923.**—*Kenya: Ann. Rept. Dept. Agric. 1923*, pp. 63–71. Nairobi, 1924. [Received 29th December 1924.]

The Coccids found on coffee in Kenya are *Aspidiotus* (*Selenaspidus*) *articulatus*, Morg., *Ischnaspis longirostris*, Sign., *Pulvinaria psidii*, Mask., *Ceroplastes ceriferus*, And., *C. rubens*, Mask., *C. vinsonioides*, Newst., *Coccus africanus*, Newst., *C. viridis*, Green, *C. hesperidum*, L., *Saissetia hemisphaerica*, Targ., *S. subhemisphaerica*, Newst., *S. nigra*, Niet., *Pseudococcus persimilis*, Newst., *P. perniciosus*, Newst. & Wllc., *P. citri*, Risso, and *Asterolecanium coffeae*, Newst. The more important of these are the last two and *C. africanus*. A kerosene emulsion recommended against *P. citri* is made of a stock solution, consisting of 2 gals. paraffin, 1 gal. water and 1½ lb. sunlight soap, diluted at the rate of 1 part to 15 of water and applied hot.

The yellow-headed stem borer [*Dirphya princeps*, Jord.] is being controlled to some extent at least by a Braconid parasite. The moth, the larvae of which caused serious injury to coffee during 1922 [*R.A.E.*, A, xii, 320], has been identified as *Metadrepana* sp. [*M. andersoni*, Tams]. Other coffee pests not recorded in the previous report [*loc. cit.*] are *Leucoptera coffeella*, Guér. (coffee leaf-miner), chiefly injurious in nurseries; the cutworms, *Euxoa segetum*, Schiff., *E. spinifera*, Hb., and *Prodenia litura*, F., for which the usual remedial measures are recommended, including painting the stems 2 inches below and 3 inches above soil level with lead arsenate to which an adhesive has been added; *Gryllotalpa africana*, P. de B., attacking young plants in

nurseries; and *Brachytrypes membranaccus*, Dru., a large brown cricket that cuts the tips off at night.

Miscellaneous pests recorded are: on cotton, *Heliothis* (*Chloridea*) *obsoleta*, L., *Dysdercus nigrofasciatus*, Stål, and *Aphis gossypii*, Glov.; on maize, *Pseudococcus citri*, Risso, on the roots, *Epilachna hirta*, Thunb., eating the epidermis of the leaves, and *Calandra oryzae*, L., on cobs in the field; on sweet potato, *Diacrisia investigatorum*, Karsch, and *Herse convolvuli*, L., eating the leaves, and *Cylas formicarius*, F., in the tubers; and on *Citrus*, *Papilio demodocus*, Esp., and *Icerya purchasi*, Mask.

BRAIN (C. K.). **Host Plant Index of South African Scale Insects (Coccidae) with a List of Species found on each Plant recorded.**— *Ann. Univ. Stellenbosch*, i (Sec. A), no. 2, pp. 1–44. Cape Town, July 1924. [Received 16th December 1924.]

The contents of this paper are indicated by its title.

BRAIN (C. K.). **Preliminary Note on the Adaptation of Certain Radio Principles to Insect Investigation Work.**— *Ann. Univ. Stellenbosch*, i (Sec. A), no. 2, pp. 45–47. Cape Town, July 1924. [Received 16th December 1924.]

The adaptation of some of the principles that are employed in wireless to the investigation of insect infestation by means of sound transmission offers such important possibilities that this preliminary note is published in order to bring the subject to the notice of other workers in the same line. The method used was to convert sounds into electric currents, to amplify them, and then to reproduce them in head-phones or a loud speaker. This was accomplished with Skinderviken microphone buttons, three in series, linked to an ordinary audio-frequency amplifier through a transformer. Coupling was through a Burndept Public Address Unit, which controls the amount of current passing through the microphones. Transformer coupling was sufficiently silent to demonstrate the possibilities of such an apparatus, but a power amplifier or one with several stages of resistance coupling might give better results. It is thought, however, that success centres upon the microphone and its surroundings. In the tests the microphone buttons were mounted on a very thin sheet of hardwood, slotted into one end of a box that is isolated from outside vibration by thick felt. The box is enclosed in a larger one, of which the lid is also felt-lined, and from which the very thin (34 d.c.c.) wires lead to the coupler. The amplifier was home-made, with three large-sized transformers said to be 5 to 1, 3 to 1 and 3 to 1 ratios. It was fitted with two pairs of output terminals, one with telephone transformer and the other without, 120 ohm head-phones and a 2,000 ohm loud speaker being used. The tick of a small wrist watch was intensified through a loud speaker to audibility across a large room. Two pieces of apple tree stem, about 1 in. in diameter, infested with larvae of the apple and quince borer (*Coryphodema tristis*), were then placed in the box in contact with the partition carrying the microphones, and through the head-phones the movements of the larvae could be distinctly heard and the gnawing readily recognised. The presence of weevils (*Calandra oryzae*, etc.) in grain and in yeast cakes has likewise been detected, and it is hoped to get a microphone sufficiently sensitive

to be used for the detection of insect larvae in fruit, etc. This would have an important bearing on the selection of fruit for export, and the testing of seeds for Bruchids, weevils, etc.

JACK (R. W.). **The Coming Campaign against Locusts. Locusts as Food for Stock.**—*Rhodesia Agric. Jl.*, xxi, no. 5, pp. 596–600 & 630–632. Salisbury, October 1924.

These two papers have been noticed from another source [*R.A.E.*, A, xii, 571].

MURRAY (T.). **Weevils in Grain.**—*Rhodesia Agric. Jl.*, xxi, no. 6, p. 677. Salisbury, December 1924.

Flowers of sulphur have proved an effective preventive against weevils attacking wheat stored for seed. About 5 lb. of sulphur was well mixed with each bag of grain. The wheat kept and germinated well and was entirely free from weevils during storage, though the pest was present in numbers in the same store in untreated grain.

SYMES (C. B.). **Notes on the Black Citrus Aphis.**—*Rhodesia Agric. Jl.*, xxi, nos. 5 & 6, pp. 612–626 & 725–737, 2 pls., 7 figs. Salisbury, October & December 1924.

These notes are intended as in introduction to the study of *Aphis tavaresi*, del Guerc. (black citrus aphis) and have been collected from time to time under field and laboratory conditions extending over a period of two years. Only viviparous females have been observed. The various stages are described. This Aphid has been found throughout Southern Rhodesia ; it attacks all sweet varieties of orange (*Citrus sinensis*), lemons (*C. limonia*) and grapefruit (*C. decumana*). Only on one occasion was cotton attacked. The injury caused by heavy infestations is very serious ; unchecked colonies ruin all young growth, and the vigorous branches become deformed and bear shrivelled leaves. The most serious damage occurs during the flowering and fruit-setting period, when the attack is accompanied by a wholesale dropping of flower buds and young fruit. The stomata of the leaves also become clogged by honeydew. The development of the Aphid varies greatly according to temperature. Reproduction depends entirely on the abundance and accessibility of plant juices ; the highest rate of reproduction recorded on vigorous growth is that of a normal apterous female that deposited 47 larvae in 12 days, the lowest being 22 in 20 days. Development to maturity varies from 8 to 21 days with an average of 11·8 days. It is probable therefore that normally there are over 30 generations a year, subject to climatic conditions and the occurrence of young growth for the alate migrants. New colonies almost invariably start from one or more winged migrants that have settled on new growth. The continued reproduction of apterous forms depends on the presence of fresh vigorous and continuous growth and absence of natural enemies and heavy rains.

In Rhodesia citrus trees develop by means of a periodical and sudden pushing out of new shoots. There are two distinct periods, a sudden spurt of vigorous metabolic activity, with growth at the rate of an inch or so a day, and a cessation of general metabolism, the manufacture of chlorophyll and the hardening up of leaves and stems. A vigorous growth of young shoots favours the production of wingless

females. The production of winged forms appears to coincide invariably with a very definite, though obscure, state of the internal tissues of the food twig. This state occurs during and just after the cessation of vigorous growth. The condition and constitution of the cell sap are also apparently essential factors.

Only one internal parasite of *Aphis tavaresi*, an unidentified Braconid, has been found. Of the predacious enemies the more important are the Coccinellids, *Chilomenes lunata*, F., *Alesia bohemani*, Muls., *A. geisha*, Gorh., *Halyzia exiguenotata*, F., *Lotis* sp., and *Scymnus trepidulus*, Weise, the first two being most commonly seen. The commonest Syrphid fly in this connection is *Xanthogramma aegyptium*, Wied.

The best remedial measure is a nicotine-soap spray, which should be applied over the entire grove just before or immediately upon the appearance of the first new growth and should be started on the windward side. Experiments with two preparations containing derris have given satisfactory results.

Where cotton is grown on a citrus estate, it should be planted as far away as possible from the groves, preferably on the side away from the prevailing winds. It is pointed out that citrus is unquestionably a food-plant of *Aphis gossypii*, Glov.

THORNEWILL (A. S.). **Tree Planting and Termites (White Ants).**—*Rhodesia Agric. Jl.*, xxi, no. 6, pp. 738–739. Salisbury, December 1924.

The special points to be remembered in planting trees where they are likely to be attacked by termites are briefly discussed.

WATT (M. N.). **The Leaf-mining Insects of New Zealand. Part iv.** *Charixena iridoxa*, **Meyr.,** *Apatetris melanombra*, **Meyr.,** *Philocryptica polypodii*, **Watt (Lepidoptera). Part v. The Genus** *Nepticula* **(Lepidoptera) and the Agromyzidae (Diptera) continued, and** *Gracilaria selenitis*, **Meyr. (Lepidoptera).**—*Trans. & Proc. N.Z. Inst.*, lv, pp. 327–340 & 674–687, 9 pls., 24 figs. Wellington, N.Z., 30th September 1924. [Received 29th December 1924.]

The leaf-miners described are mostly found in native weeds or shrubs ; they include *Nepticula lucida*, Philp., and *Gracilaria selenitis*, Meyr., attacking beech, and *Haplomyza chenopodii*, sp. n. (beet fly) reared on white and silver beet, spinach and various weeds.

GAHAN (A. B.). U.S. Bur. Ent. **On the Identity of** *Eurytoma oleariae*, **Mask.**—*Trans. & Proc. N.Z. Inst.*, lv, pp. 687–688. Wellington, N.Z., 30th September 1924. [Received 29th December 1924.]

A Hymenopteron from New Zealand which is without much doubt parasitic on a species of *Cecidomyia*, possibly *C. olearíae*, Mask., and was described as *Eurytoma olearíae*, Mask., is now found to be a Platygasterid. Although perhaps a new genus should be erected for it, its relation to *Metaclisis* is so close that it is deemed best to place it provisionally in that genus. A re-description of it is given.

BALLARD (E.). **Summary of Entomological Progress Reports (Australia).**—*Empire Cotton Growing Rev.*, ii, no. 1, pp. 40–41. London, January 1925.

It is thought that the discovery of *Platyedra gossypiella*, Saund. (pink bollworm) in the coastal areas of Queensland will render necessary quarantine measures to prevent the movement of seed cotton from one State to another, except under guarantee that it has been effectively treated to destroy all long-cycle bollworm larvae. Measures will also have to be taken for the separate ginning of seed from the coastal areas and the segregation of lint and seed cotton from those areas where the insect has not yet been reported. Cotton bolls were also greatly injured in 1923–24 by *Dichocrocis punctiferalis* (peach moth) and by *Heliothis obsoleta*. Sucking insects, such as the harlequin bug [?*Dindymus versicolor*], are responsible for the introduction of internal boll rot through their punctures of the bolls. A survey of the chief cotton-growing areas of Queensland is briefly reported upon.

RUHMANN (M. H.). **Injurious Insects.**—*British Columbia Dept. Agric.*, Bull. 68, 2nd Edn., pp. 58–97, 23 figs. Victoria, B.C., 1924.

This paper is a revision of one previously noticed [*R.A.E.*, A, iv, 360], and contains, in addition, accounts of the Aphids, *Aphis pomi*, *A. sorbi* and *Siphonaphis padi* (*A. avenae*); *Rachela bruciata* (Bruce's measuring worm); *Tortrix* (*Cacoecia*) *rosaceana* (oblique-banded leaf-roller); *Pulvinaria vitis* (cottony maple scale); *Olene vagans* (grey tussock moth); *Eriocampoides limacina* (*Caliroa cerasi*) (cherry and pear slug); *Brevicoryne* (*Aphis*) *brassicae* (cabbage aphis); and *Leptinotarsa decemlineata* (Colorado potato beetle).

HOY (B.). **Sprays and Spraying.**—*British Columbia Dept. Agric.*, Bull. 68, 2nd Edn., pp. 98–109. Victoria, B.C., 1924.

This is a revision of a paper previously noticed [*R.A.E.*, A, iv, 361].

GRIFFIN (E. L.) & BACK (E. A.). **Absorption and Retention of Hydrocyanic Acid by Fumigated Food Products. Part ii.**—*U.S. Dept. Agric.*, Dept. Bull. 1307, 8 pp. Washington, D.C., 12th November 1924.

Experiments previously described [*R.A.E.*, A, xi, 550] have been continued. Dried fruits which were not in tight packages absorbed some hydrocyanic acid, which was gradually dissipated, though a small quantity was left in many of the fruits at the end of 90 days. When packed in commercial packages (waxed paper, etc.) or tightly packed, they absorbed less gas and therefore presumably would not be so effectually protected from insect infestation. Sweets and chocolates, etc., absorbed varying quantities of acid, but most of the fumigant was dissipated in a very short time. None of the fumigant was absorbed through the rind of an American Swiss cheese. None was absorbed by cheese tightly wrapped in tinfoil, but a loose wrapping gave the same result as none at all. Boiling in water for 30 minutes was not always sufficient to remove the acid entirely. The safety of fumigated food for human consumption is not touched upon in these experiments.

Parrott (P. J.), Stewart (F. C.) & Glasgow (H.). **Spraying and Dusting Experiments with Apples in 1923.**—*New York Agric. Expt. Sta.*, Circ. 70, 9 pp. Geneva, N.Y., 1st December 1923. [Received 19th December 1924.]

Experiments continued on the same lines as in the previous year [*R.A.E.*, A, xi, 358] indicate the effectiveness of nicotine dust (sulphur-lead arsenate 90 : 10, with 2 per cent. nicotine) on apples in the early pink stage for the control of Aphids. Attention is also called to the success obtained with the wettable sulphur sprays, against codling moth [*Cydia pomonella*] and red bug [*Heterocordylus malinus*], the formula for which was 4 lb. hydrated lime, 8 lb. sulphur and 1½ lb. powdered lead arsenate to 50 U.S. gals. of water, with 1 lb. calcium caseinate or 4 ozs. glue per 100 U.S. gals. as a spreader. The tables show that, while on the average not quite so effective as lime-sulphur solution in controlling apple scab, these sprays have proved safer on apple foliage.

Chittenden (F. H.). U.S. Bur. Ent. *Diabrotica tricincta* **Say injurious in New Mexico.**—*Bull. Brooklyn Ent. Soc.*, xix, no. 5, pp. 184–185, 1 fig. Lancaster, Pa., December 1924.

This is apparently the first record of serious injury by *Diabrotica tricincta*, Say. It was found to be attacking beans, squash, cucumber, cantaloup, watermelons and other crops during July 1923 in New Mexico. It also occurs in Colorado and Arizona, and has been recorded in Mexico.

Batchelor (L. D.). **Walnut Culture in California.**—*Cal. Agric. Expt. Sta.*, Bull. 379, 91 pp., 34 figs. Berkeley, Cal., June 1924.

The part of this paper dealing with the insect pests of the walnut in California is the same as in a previous one [*R.A.E.*, A, x, 286], except that 10 lb. instead of 6 of dry basic lead arsenate are recommended for a 200 U.S. gals. tank for the control of *Cydia pomonella* [*cf. R.A.E.*, A, x, 512].

Wymore (F. H.). **Biology and Control of the Garden Centipede** *Scutigerella immaculata* **(Newport).**—*Jl. Ent. & Zool.*, xvi, no. 3, pp. 73–88, 5 figs. Claremont, Cal., September 1924.

Most of the information here given on *Scutigerella immaculata*, Newp., which is a serious pest of vegetable crops in California, has already been noticed [*R.A.E.*, A, xii, 578]. This paper also contains a full description of the pest and a review of previous literature.

Swenk (M. H.). **Hessian Fly Control in Nebraska.**—*Nebraska Crop Growers' Assoc. 15th Ann. Rept. 1923–24*, pp. 86–98, 2 graphs. Lincoln, Neb., 1924.

The history, distribution and control of the Hessian fly [*Mayetiola destructor*, Say] in Nebraska are described. Successful control is

chiefly dependent on a study of fly-free dates for sowing. Special observations along these lines have been made, and the method of adapting the selected dates to various localities is pointed out.

EVENDEN (J.). **Pine Butterfly Epidemic in Northern Idaho.**—*The Timberman*, reprint, 1 p., 2 figs. Portland, Oregon, May 1924.

A very extensive outbreak of *Neophasia menapia* (pine butterfly) occurred in Idaho during 1923, approximately 30,000 acres of high-grade yellow pine [*Pinus ponderosa*] being defoliated by the larvae. The outbreak was first recorded during the summer of 1922. The eggs are laid on the needles in a row of from 5 to 15, usually at the top of mature trees. They hatch the following June. The mature larvae descend to the ground by a silken thread and pupate on shrubs, tree trunks, fences, etc., in early August. The pupal stage lasts 2 or 3 weeks. Owing to the activities of the Ichneumonid parasite, *Theronia fulvescens*, and the predacious Pentatomid, *Podisus placidus*, little damage is expected in 1924.

The exact economic importance of this pest is uncertain; it is possible in many cases that the trees will not recover from the injury and will die in a year or two. A previous outbreak (1903) was followed by extensive injury by *Dendroctonus brevicomis*.

MELANDER (A. L.), SPULER (A.) & GREEN (E. L.). **Oil Sprays. Their Preparation and Use for Insect Control.**—*Washington Agric. Expt. Sta.*, Bull. 184, 31 pp. Pullman, Wash., November 1924.

Directions are given for making good oil sprays, which are cheaper than lime-sulphur and give better control for most insect pests of fruit. They are made from either miscible oils or emulsion stocks. A miscible oil is an oil solution of an emulsifier. An emulsion stock is a concentrated emulsion, containing oil, emulsifier and water. Miscible oils require more care in dilution, the first water must be slowly added and thoroughly worked in. For dormant spraying, the best results in 1924 were obtained with the so-called neutral type of lubricating oil; heavier oils apparently lack penetration, and lighter oils have not body enough. Used crank-case oil was tried, but is too uncertain in composition to be dependable. The results obtained with various proprietary oils are tabulated; some proved inefficient, while others vary in composition from year to year. The best emulsifier for miscible oil is cresoap, which is used in the proportion of 10 per cent. by weight (or 9 per cent. by volume) to 90 per cent. weight (or 91 per cent. volume) of lubricating oil. It is made by dissolving 5 parts by volume (or 5½ by weight) of potash fish-oil soap in 4 parts by volume (or 4½ by weight) of cresol (crude cresylic acid 97–99 per cent.). The soap should contain no free alkali and should have 30 per cent. of moisture. When the soap is mixed with the cresol, the emulsifier becomes fluid and will dissolve at once in the oil. Soda or weak potash soap should not be substituted for the potash fish-oil soap. This formula constitutes the most concentrated miscible oil, and 4¼ gals. of the stock are needed to make 100 gallons of 4 per cent. spray. This stock requires no boiling or pumping and does not freeze or spoil

on standing; its increased efficiency more than compensates for its greater cost. Where water is very hard this miscible oil is not recommended; a non-soap spray should then be used.

The best non-soap emulsifiers for emulsion stocks are calcium caseinate spreader and glue. These emulsions are mechanical mixtures, depending on the vigorous pumping together of the ingredients to break the oil into droplets, and hence cannot be as perfect as the micellar emulsions prepared with soap. Kerosene can be emulsified more easily with cresoap or calcium caseinate than with boiling soap. Emulsion stocks should not be made to contain more than 75 per cent. of lubricating oil or 67 per cent. of kerosene, or a reversed emulsion will result, which will not mix with water. If an oil spray breaks, showing a floating layer of oil or curds, the watery portion will probably be too weak to be effective, while the oily scum is injurious to trees. Soap emulsions are best where water is soft or alkaline, and non-soap emulsions where it is hard.

Dormant sprays of lubricating oil should be applied when buds begin to swell in early spring. For scale-insects they should contain 4 per cent. of actual oil, and for leaf-roller 8 per cent. A 2 per cent. oil spray, hitherto widely advocated, is too weak for San José scale [*Aspidiotus perniciosus*, Comst.] under Washington conditions. As a summer spray, 1 per cent. of oil is useful for red spider and immature scales, but is not strong enough for old scales or for Aphids. Summer sprays containing more than 1 per cent. of oil may cause scorching if used in very hot weather on delicate plants.

STEINER (G.). **On some Plant Parasitic Nemas and Related Forms.**—*Jl. Agric. Res.*, xxviii, no. 11, pp. 1059–1066, 4 pls. Washington, D.C., 14th June 1924. [Received 30th December 1924.]

Notes are given on various Nematodes. *Cephalobus subelongatus*, Cobb, was found infesting living green leaves of *Phlox drummondi* in Maryland. A description is given of the male, and the original description is supplemented. This species is probably omnivorous, and more attention should be given to the ability of the members of this genus to enter and live in healthy plants. *Kigelia pinnata*, the African sausage tree, is added to the list of food-plants of *Heterodera radicicola*, Greef, which has also been noted as infesting snapdragon (*Antirrhinum majus*) in Washington, D.C. *Aphelenchus ritzemabosi*, Schwartz, previously only known from chrysanthemums, is now recorded from *Phlox drummondi* from Washington. Specimens that had withstood desiccation for 22 months in chrysanthemum leaves and then moulted withstood a further drying for 3 weeks in the adult stage. A study of the intestinal contents of *Dorylaimus regius*, de Man, indicates that this species is carnivorous. It was found in Philadelphia about roots of *Amaryllis* imported from Germany and roses from Norway. Additional descriptive notes are given.

Paratylenchus nanus, Cobb, has been taken from the exterior tissues of roots of *Zinnia elegans*. The infested roots showed no abnormalities other than brownish surface spots, indicating that plants react very differently to various parasitic Nematodes. This appears to be additional evidence that the chief damage that *Heterodera* and some other Nematodes do to their food-plants is caused by the secretion of toxic substances.

Back (E. A.) & Cotton (R. T.). U.S. Bur. Ent. **Effect of Fumigation upon Heating of Grain caused by Insects.**— *Jl. Agric. Res.*, xxviii, no. 11, pp. 1103–1116. Washington, D.C., 14th June 1924. [Received 30th December 1924.]

The following is an extract from the authors' summary :—It has been assumed by certain grain authorities that when wheat shows a moisture content of less than 14·5 per cent. it is likely to remain in condition if given proper storage and kept free from insects. However, when insects are present, grain has been known to heat when the moisture content is as low as 12 per cent. A study of 15,000,000 bushels of wheat by the Bureau of Markets indicated that when the moisture content was as low as 11·3 to 12 per cent., heating due to insect infestation occurred, and resulted in the conclusion, by eliminating factors of moisture, damage, and time storage, that the rising temperatures were caused by insect infestation. The authors have known chick-peas [*Cicer arietinum*] in 240-pound sacks to heat as a result of attack by *Bruchus quadrimaculatus*, the temperature rising to as high as 103° F. when the normal temperature was 58° F. Wheat stored in farmers' bins and well infested by *Calandra* (*Sitophilus*) *oryzae* and *Laemophloeus* (*Cryptolestes*) *pusillus* was found to have developed a temperature as high as 109° F. when the normal was 27° F. The cause of heating when insects are present in numbers is not clearly understood. Probably the most prevalent opinion is that heating is due to fermentation started by the attraction of moisture to the faeces of the insects. It has also been attributed to the mechanical friction due to the insects' feeding. It is known that the honeybee cluster in winter can develop by muscular activity, not unlike shivering, a temperature in the hive of 86–95° F. when the normal temperature is but 32° F. As many as 1,500 examples of *Carthartus cassiae* have been recorded in 1 lb. of bran heating at a temperature of 95° F. The authors estimated one 240-pound sack of chick-peas with a temperature of 102° F. to contain 3,550,960 Bruchids in various stages of development ; the sacks not heating and having a normal temperature of 58° F. showed no infestation. It is undoubtedly true that when grain heats badly as a result of insect infestation the insects are present in great abundance. In ordinary storage heating, seeds radiate sufficient heat to raise appreciably the temperature in the spaces between the sacks. The temperature, which was 58° F. between uninfested sacks of chick-peas, was raised to as high as 70° F. between infested and heating sacks, with the result that the Bruchids, dormant at 58° F., were able to multiply and actively spread the infestation. The activity of pests in stored maize and wheat is made possible in like manner by heating. Heating permits feeding and reproduction to progress in the dead of winter. Fumigation reduces the temperature of the seeds to the normal and thus prevents progressive destruction. Unless it can be proved that bacteria, moulds, or other agencies causing heat are destroyed by fumigation with hydrocyanic-acid gas or carbon bisulphide, the authors conclude that the activity of certain stored-product pests is directly responsible for the development of heat in grain in certain instances and that fumigation will permit the grain to return to normal temperature.

Root (F. M.). **Parasitism among the Insects.**—*Scientif. Mthly.*, ix, pp. 479–495. [New York] November 1924.

This is a brief survey of the various phenomena in insects that may be classed under the general head of parasitism.

Stearns (L. A.). **The Present Status of the Oriental Fruit Moth in Northern Virginia, with Report of Recent Orchard Spraying Experiments on its Control.**— *Virginia Agric. Expt. Sta.*, Bull. 234, 28 pp., 9 figs. Blacksburg, Va., February 1924. [Received 30th December 1924.]

Cydia (*Laspeyresia*) *molesta*, Busck (oriental fruit moth) has spread over an area of about 1,000 sq. miles in Virginia. In large and well cared-for commercial peach orchards, where a regular spray schedule is followed, it does comparatively little harm, but there are many neglected small ones where infestation is very heavy and much injury results. Early and mid-season varieties of peaches, which ripen in Virginia between late July and early September, and which constitute 73 per cent. of the commercial crop of the State, are comparatively free from attack, since almost half the potential infestation of the season occurs after mid-August. As the usual summer schedule treatments for peaches coincide closely with the dates of heaviest egg-laying and hatching, if applied with care they will give adequate protection against the insect. The egg, larval and pupal stages are becoming increasingly subject to attack by many parasites of native fruit insects. As many larvae hibernate in cocoons under rubbish, on mummied fruits on the ground, or in crevices of bark or crotches of branches normally removed by pruning, clean cultivation and winter pruning will considerably reduce the numbers of the insect. Nicotine sulphate 40 per cent., at a dilution of 1 : 800, added to the usual summer treatments, increased the spray efficiency from 8 to 14 per cent. in the case of this particular insect, but its use is scarcely economical in cases of extremely light infestation.

Underhill (G. W.). **The Lesser Clover Weevil.**—*Qtrly. Bull. Virginia State Crop Pest Commiss.*, vi, no. 1, pp. 1–7, 1 pl., 3 figs. Blacksburg, Va., April 1924. [Received 30th December 1924.]

Hypera (*Phytonomus*) *nigrirostris*, F. (lesser clover weevil) is an important pest of red clover in Canada and the United States, both adults and larvae feeding on the foliage, heads and stems. The adults eat irregular slits between the veins of the leaves, and the latter feed on the flowers, but the damage they do is negligible after June in Virginia. The chief damage is done by the larvae, which feed on the developing buds and heads. There is only one generation a year; the eggs are laid from early April to mid-June, generally in the stipules of the leaves, and hatch in about 12 days. The greatest damage is done between early April and mid-June; by that date practically all the larvae are mature, and they pupate among leaves and rubbish on the ground or on the clover plant. After an average of 8 or 9 days, the adults emerge and feed; they become less active as the summer advances and finally hibernate under rubbish in or along the borders of the clover field. Parasites reared from the larvae included *Microbracon mellitor*, Say, one individual of a new species of *Microbracon*, *Bathyplectes exigua*, Grav., *Bassus albicinctus*, Ashm., and one *Spilochalcis* sp. The eggs are parasitised by *Anaphes iole*, Gir. During wet seasons a fungus kills a certain number of the larvae, but cannot be considered very important. When clover is being severely injured, the hay should be cut at once and the field harrowed and dragged immediately; this will destroy the insects and increase the prospect

of a second crop. Short systematic rotation of crops, pasturing or grazing in early spring, and destruction of self-sown clover will aid in destroying this and other clover pests.

Sugar Cane Entomology.—*Hawaiian Planters' Record*, xxviii, no. 4, pp. 443–446. Honolulu, October 1924.

A review is given of a number of papers read at the meeting of the sugar-cane section of the first Pan-Pacific Food Conservation Conference from 28th July to 14th August 1924, including: An account of the major sugar-cane insect pests in Hawaii, their control and natural enemies introduced against them, by O. H. Swezey; an account of experiments in control of sugar-cane grubs in Queensland, by H. Freeman; the establishment of the cane borer Tachinid in northern Queensland, by M. S. Barnett; the application of *Metarrhizium anisopliae* for the control of *Alissonotum impressicolle* and allied beetles and of *Phanurus beneficiens* against stalkborer in Formosa, by M. Ishida; the migration of leafhoppers from tropical America into the United States, by H. Osborn; insects affecting sugar-cane in South American countries, by F. X. Williams; notes on *Pseudococcus sacchari*, by T. D. A. Cockerell; report on termites as the worst sugar-cane pest in Gwalior State, India, by R. L. Pendleton; and insect enemies of sugar-cane in Mexico, by R. H. van Zwaluwenburg.

Barreto (B. T.). **Las uvas de Almeria.** [Grapes from Almeria.]—*Agricultura*, ii, no. 2, p. 3, 2 figs. Santiago de las Vegas, November 1924.

In spite of the existing quarantine, a shipment of 1,500 barrels of grapes from Almeria, Spain, was landed at Havana in October 1924. As the result of a protest by the United States, the grapes were inspected and were found to be infested by *Ceratitis capitata*, Wied. They were at once re-shipped, as otherwise all Cuban fruits would have been excluded from the United States.

Box (H. E.). **Report upon a Trip to Porto Rico, April-July, 1924.**—8vo, 22 pp. Berbice, Brit. Guiana, S. Davson & Co., Ltd., November 1924.

This is a record of a trip to Porto Rico made for the purpose of studying the Tachinid, *Lixophaga* (*Euzenilliopsis*) *diatraeae*, Towns., and of transporting numbers of it to British Guiana in the hope of establishing it as a parasite of the small moth borers of sugar-cane, *Diatraea saccharalis*, F., and *D. cancella*, Hmpsn. The diseases and pests of sugar-cane in the island are discussed, and the relation of Aphids (particularly *Aphis maidis*, Fitch) to mosaic disease is briefly described.

The insect pests include the white grubs, *Lachnosterna vandinei*, Smyth, and *L. portoricensis*, Smyth, which are the worst pests of cane, and for which fumigation of the soil by means of carbon bisulphide emulsion seems to be the best remedy. Other pests have been previously recorded [*R.A.E.*, A, x, 97]. *D. saccharalis* does very little damage in Porto Rico compared with British Guiana. *D. cancella* does not occur in the island. There are two species of egg-parasites in both places, namely, *Trichogramma minutum*, Riley, and *Prophanurus*

alecto, Crawf. No Hymenopterous parasites are known to attack the larvae in Porto Rico, but the author has introduced *Ipobracon grenadensis*, Ashm., and it is hoped that this will become established.

Two parasitic flies occur in Porto Rico, *L. diatraeae*, Towns., and a species of *Sarcophaga*, which is a more or less accidental parasite, attacking many other insects besides *Diatraea*. The former has already been introduced into Louisana and Mexico, though it is too soon to determine whether it has become established. The adult fly probably lays its eggs on the body of the host when the latter is outside its tunnel, or else drops them into the tunnel in the cane stalks. The larvae apparently hatch within a few hours and make their way into the body of the host; the later larval stages of the moth are generally attacked, and the host frequently pupates with the parasite maggot within it. As a rule only one parasite emerges from each borer, but occasionally two or three have done so. The parasitism varies in degree according to locality and season, but occurs on canes of all ages. Generally speaking, it is higher in the north than the south of Porto Rico, and this may account for the greater scarcity of the borer in the northern portions. From this it appears that the parasite prefers a locality with a heavy rainfall. Over the whole island the average of parasitism was about 15 per cent. The method of consignment of the parasites to British Guiana is described.

Wolcott (G. N.). **The Food of Porto Rican Lizards.**—*Jl. Dept. Agric. Porto Rico*, vii, no. 4, October 1923, pp. 5–37. Rio Piedras, P.R., August 1924. [Received 30th December 1924.]

The value of lizards as destroyers of insects in Porto Rico is discussed [*R.A.E.*, A, viii, 483]. The conclusion is reached that although a few beneficial insects are thus destroyed, the numbers of destructive insects devoured are so much greater that lizards are very desirable allies.

[Wolcott (G. N.).]. **First Supplement to Insectae Portoricensis.**—*Jl. Dept. Agric. Porto Rico*, vii, no. 4, October 1923, pp. 38–43. Rio Piedras, P.R., August 1924. [Received 30th December 1924.]

This supplement contains various corrections and additions to the work previously noted [*R.A.E.*, A, xii, 251].

Wolcott (G. N.). **Entomología Económica Puertorriqueña.** [The Economic Entomology of Porto Rico.]—*Estación Exp. Insular Rio Piedras, P.R.*, Bol. 32, 176 pp., 98 figs., 12 pls. S. Juan, P.R., July 1924. [Received 30th December 1924.]

Information on the insects of economic importance in Porto Rico, which has been previously published in numerous circulars and bulletins, is here collected together.

do Amaral Castro (J.). **A colheita natural e o combate ao** *Stephanoderes*. [The Natural Method of Harvesting Coffee and the Control of *Stephanoderes*.]—*Rev. Soc. rur. brasileira*, v, no. 53, pp. 342–343. S. Paulo, November 1924.

It is pointed out that the new method of harvesting the coffee crop now being introduced in Brazil [which apparently consists of picking

the berries as they ripen] deprives *Stephanoderes* [*hampei*] of opportunities for breeding, whereas under the usual method of harvesting berries had time to become severely infested.

DE TOLEDO PIZA JUNIOR (S.). **Uma nova especie de Ipidio do genero** *Stephanoderes*. [A New Species of Scolytid of the Genus *Stephanoderes*.]—*Rev. Soc. rur. brasileira*, v, no. 53, pp. 354–355, 2 figs. S. Paulo, November 1924.

Stephanoderes largipennis, sp. n., is described from specimens from the fruits of rose and coffee in Brazil. The differences distinguishing it from *S. hampei*, Ferr. (*coffeae*, Hgd.) are figured.

NEIVA (A.), NAVARRO DE ANDRADE (E.) & QUEIROZ TELLES (A.). **Instrucçoes para o combate á broca do café.** [Instructions for Combating the Coffee Borer.]—*Serviço de Defesa do Café*, Publicação no. 3, 15 pp., 7 pls., 1 map. S. Paulo, 1924.

The information given in this paper on *Stephanoderes hampei*, Ferr., is substantially the same as noticed from previous reports [*R.A.E.*, A, xii, 484, 501].

Regulamento da Defesa Sanitaria Vegetal. Decreto n. 15.198, de 21 de dezembro de 1921. Decreto n. 16.509, de 21 de junho de 1924. [Regulations of the Brazilian Plant Protection Service. Decrees no. 15,198 of 21st December 1921 and no. 16,509 of 21st June 1924.]—*Serviço de Defesa do Café*, Publicação no. 4, 28 pp. S. Paulo, 1924.

The text of the regulations of the Brazilian Plant Protection service is given. The decree of 21st June 1924 confers on the authorities of the State of S. Paulo the power to execute in the State territory all these regulations, except those dealing with the importation or exportation of living plants or parts of plants.

MEYRICK (E.). **Exotic Microlepidoptera.**—iii, pts. 3 & 4, pp. 65–128. [Published by the author, Marlborough, Wilts., November & December 1924. Price 3s. per part.]

The new species described include the Heliodinid, *Stathmopoda synchrysa*, infesting cotton bolls in Fiji; the Eucosmids, *Spilonota holotephras*, feeding on leaves of guava (*Psidium*) in Fiji and *Eucosma hapalosarca*, defoliating *Populus euphratica* in the Punjab; the Lyonetiid, *Hectacma indicatrix*, and the Coleophorid, *Agonoxena pyrogramma*, feeding on leaves of coconut from the Solomon Islands; the Gracilariid, *Acrocercops helicomitra*, mining leaves of *Gossypium* in Brazil; the Cosmopterygids, *Labdia stibogramma*, feeding in Brazil nuts (*Bertholletia*) in the Malay States and *Eumenodora tetrachorda*, infesting needles of *Casuarina* in India; and the Oecophorid, *Macrobathra notomitra*, bred from larvae in spun shoots of *Acacia catechu*.

Bruner (S. C.). **Notas sobre el piojo de la palma real.** [Notes on the Bug attacking Royal Palms.]—*Rev. Agric. Com. Trabajo*, vii, no. 3, pp. 27–28, 1 fig. Havana, 1924.

The withering of the leaves of royal palms [*Oreodoxa regia*] at Hoyo Colorado in Cuba has been traced to attack by a Lygaeid, *Xylostodoris luteolus*, Barber. It is an indigenous species very abundant in May and June, but owing to its short duration the attack is not of great importance. In the case of specially valuable specimens of the palms the spray of nicotine sulphate and soap advocated for use in Florida, where the injury seems more serious, may be applied [*R. A. E.*, A, x, 120].

Spray for San José Scale this Winter.—*Qtrly. Bull. State Pl. Bd. Mississippi*, iv, no. 3, pp. 4–6. A. & M. College, Miss., October 1924.

The San José Scale [*Aspidiotus perniciosus*, Comst.] is considered to be the worst orchard pest in Mississippi, and practically all orchards should be sprayed to control it. Instructions are given for making standard mixtures of lubricating oil emulsion, miscible oil sprays and lime-sulphur concentrate, as well as for home-made lime-sulphur wash.

Severin (H. C.). **Department of Entomology.**—*Ann. Repts. S. Dakota Agric. Expt. Sta. 1922 & 1923*, pp. 17–21 & 22–25. Brookings, S. D. [1923 & 1924.] [Received 5th January 1925.]

A list is given of the parasites recorded in S. Dakota from *Gryllus assimilis*, F. (common field cricket), including the Hymenopterous egg parasites, *Ceratoteleia marlatti*, Ashm., and *Paradris brevipennis*, Fouts, the Tachinid, *Exoristoides johnsoni*, Coq., parasitic on the nymphs and adults, and various mites and other enemies. Experiments with poison baits for this cricket have led to the adoption of a formula consisting of 25 lb. bran, $1\frac{1}{2}$ lb. white arsenic or Paris green, 1 U.S. gal. molasses and $3\frac{3}{4}$ U.S. gals. water. This should be applied in the cool of the evening, 4 lb. of the dry bran being used per acre. In lucerne fields, the bait should be applied after the first cutting of the hay. Where irrigation is practised, the cut-over lucerne should be irrigated before the bait is applied; in other places the bait should be applied after heavy rain. In the tests, one application killed at least 50 per cent. of the crickets.

Further studies have been made of *Meromyza americana*, Fitch (wheat stem maggot), and a list is given of the cultivated and wild food-plants of this fly. Natural enemies include the Hymenopterous parasites, *Coelinidea meromyzae*, *Microbracon meromyzae*, and a new species of *Eurytoma*, which has been reared during 1923; the mites, *Pediculoides ventricosus*, attacking the larvae, and *Trombidium* sp. attacking the adult; and a fungus. Many poison baits have been tried with little success, but a few showed some promise and will be tested further. Light traps and hand picking over large and small areas have proved a failure.

Bronzy Orange Sucking Bug.—*Queensland Agric. Jl.*, xxii, pt. 5, p. 362. Brisbane, November 1924.

As the bronzy orange sucking bug [*Oncoscelis sulciventris*, Stål] has been proclaimed a pest under the Diseases in Plants Act, every

citrus grower is obliged to adopt one of the official remedial measures should he find the pest present. The preparation and application of these are briefly described ; they are fumigation of the trees with cyanide, dislodging the immature stages by tapping and banding the trees with adhesive to prevent their return, and the application of contact sprays [*R. A. E.*, A, xi, 572]. *O. sulciventris* is appearing again in large numbers throughout the North Coast fruit district.

GATER (B. A. R.). **Insect Pests of Labuan and Adjacent Islands.**—*Malayan Agric. Jl.*, xii, no. 11, pp. 374–376. Kuala Lumpur, November 1924.

The following insect pests are recorded from Labuan and adjacent islands north-west of Borneo, their local distribution being discussed : on coconut, *Brachartona catoxantha*, Hmps., *Oryctes rhinoceros*, L., *Rhynchophorus schach*, Oliv., *Batrachedra arenosella*, Wlk., *Tirathaba* sp., *Amathusia phidippus*, L., *Setora* sp., *Valanga nigricornis*, Burm., and *Aspidiotus destructor*, Sign ; on rice, *Spodoptera* sp., *Cnaphalocrocis medinalis*, Guen., *Nephotettix bipunctatus*, F., *Oxya* sp., *Padraona* (?) *gola*, Moore, *Cylas formicarius*, F., *Casnoidea cyanocephala*, F., and *Alesia discolor*, F. ; on *Hibiscus* spp., *Earias fabia*, Stoll, *Dysdercus* sp. near *simplex*, Wlk., *D. cingulatus*, F., *Pseudococcus citri*, Risso, *Saissetia nigra*, Nietn., *Odontopus* sp., and *Serinetha* sp ; on *Citrus*, *Papilio polytes*, L., *Aleurocanthus spiniferus*, Quaint., and *Pseudococcus citri*, Risso ; on bananas, *Erionota thrax*, L. ; and on mango, *Idiocerus* sp., and beetles, probably *Cryptorrhynchus mangiferae*, F.

Miscellaneous pests recorded are *Adoretus compressus*, Weber, *Apogonia cribricollis*, Burm., and *Locusta migratoria*, L.

This list is the result of a week's collecting during observations on *Brachartona catoxantha*, the details of which are to be published elsewhere.

TAKAHASHI (R.). **Some Aphids from the Island Palau (Micronesia).**—*Trans. Nat. Hist. Soc. Formosa*, xiv, no. 72, p. 30. Formosa, 1924.

The Aphids of the Island of Palau are very few ; they include *Aphis gossypii*, Glov., *A. medicaginis*, Koch, and *A. maidis*, Fitch.

TOKUTA (Y.). **Studies on the Honey Bee with special Reference to the Japanese Honey Bee.**—*Trans. Sapporo Nat. Hist. Soc.*, ix, pt. 1, pp. 1–27, 2 pls. Sapporo, Hokkaido, November 1924.

The morphological and biological differences between the Japanese honey bee, which is thought to be a variety of *Apis indica*, F., and *A. mellifera*, L., are discussed in detail.

TAYLOR (H. S.). **The Khapra Beetle : its Influence on the Moisture Content of Malt in Store.**—*Bull. Bur. Bio-Technol.*, ii, no. 13, pp. 113–117. Leeds, 1st December 1924.

In searching for the source of infestation by the khapra beetle [*Trogoderma granarium*, Everts] in stored malt, the author found large numbers behind the matchboards in the malt bins and behind the asbestos covering of the kiln shafts. From the latter place over 4 bushels of living and dead insects were collected. Contrary to the author's previous view that these insects could not develop in malt

or grain that had a moisture content of less than 2 per cent., and that this moisture was communicated to the grain or malt by outside influences, it now appears as though they are themselves capable of producing moisture. It was found that the moisture content was higher by as much as 7–7½ per cent., where it was absolutely impossible for it to be influenced by outside conditions, this being also where infestation was most serious. The moisture content of the malt on the floor was 3·3 per cent.

MASON (F. A.). **The Khapra Beetle in British Maltings.**—*Bull. Bur. Bio.-Technol.*, ii, no. 13, pp. 118–123. Leeds, 1st December 1924.

In view of the continued importation of *Trogoderma granarium*, Everts, in shipments of Indian barley and in grain shipped from African ports into England, the author calls attention to the seriousness of this pest when introduced into maltings and breweries in this country. A general account of the beetle is given; one of the most surprising facts about its life-history is its capacity for prolonged hibernation. Various instances in this connection are quoted. It will live for years without food and apparently without air. As the conditions in maltings are entirely artificial and variable, the behaviour of the pest will be correspondingly different in its periods of larval activity, hibernation, pupal rest and emergence. Larvae have been kept in Petri dishes without change for 3 years. Though the adults are apparently seldom seen, they can always be found in the joints of the floor boards in maltings where the larvae occur. In these places minute larvae may also be found, and it is probable that the eggs are laid there among the particles of grain. The khapra beetle apparently thrives at the anomalous temperature of 56° C. [132·8° F.]. That it prefers this high temperature and can produce it by physiological processes in which the destruction of malt is involved is shown by the conditions of material in bins badly infested with this insect, which always show a grain temperature of 112–120° F., a fact that frequently leads to the discovery of the pest.

Traps [*R. A. E.*, A, xii, 483] are not recommended, as it is considered that they will only attract the insects that are already on the outside of the grain. The best method of control is fumigation with chloropicrin.

P[ARKER] (T.). **White Fly on Hops.**—*Bull. Bur. Bio-Technol.*, ii, no. 13, pp. 127–128, 1 fig. Leeds, 1st December 1924.

When *Trialeurodes vaporariorum* was introduced into a greenhouse containing hops as well as other plants, such as tomatos, cucumbers, and chrysanthemums, they all became infested, but a distinct partiality was shown for hops. It therefore seems possible that, given favourable climatic conditions, this pest might be serious in the open on hops.

ZACHER (F.). **Schädlinge aus der Familie der Speckkäfer (Dermestidae).** [Pests from the Family of the Bacon Beetles.]—*Aus der Heimat*, xxxvii, no. 7–8, reprint, 7 pp., 4 figs. [Berlin] 1924.

This is a brief account of *Dermestes lardarius*, L., *Attagenus pellio*, L., *Anthrenus scrophulariae*, L., *A. verbasci*, L., and *Trogoderma granarium*, Everts, and of the injury done by them.

ZACHER (F.). **Tierische Schädlinge im Bäckergewerbe.** [Animal Pests in the Bakers' Trade.]—*Festschrift zum 50-jähr. Bestehen des Central-Verbandes Deutscher Bäcker. „Germania"*, reprint, 7 pp., 5 figs. Berlin, 1924.

This article on the various insect pests found in bakeries in Germany contains no new information.

GOODWIN (W.) & MARTIN (H.). **The Estimation of "Polysulphide" Sulphur in Spray Materials.**—*Jl. Agric. Sci.*, xv, pt. 1, pp. 96–105, 1 fig. London, January 1925.

The following is the authors' summary of this paper: The value of lime-sulphur, liver of sulphur and ammonium polysulphide depending upon the amount of polysulphides they contain, there is need for an exact method for the estimation of their content of polysulphide sulphur. The method of R. M. Chapin [described in *Jour. Ind. & Eng. Chem.*, viii, p. 339 (1916)], who employed the reaction of sodium sulphite with sulphur to form this sulphate, and estimated the latter by titration with iodine, has been tested under a variety of conditions, and, with slight modifications to increase rapidity and ease of manipulation, it is recommended as being sufficiently accurate for the purpose in view.

PARKER (T.). **Scientific Control of Pests and Diseases.**—*Bull. Chamber Hortic.*, ii, nos. 2 & 3, pp. 24–25 & 48–50. London, June & December 1924.

Such general measures for the control of insect pests and plant diseases as cultivation, pruning and the use of egg washes and other insecticides are discussed.

PARKER (T.). **Tar Oil Emulsions.**—*F.B.G. Jl.*, iii, no. 12, pp. 111–112. London, December 1924.

The tar oil emulsions, now so generally used as dormant sprays against insect eggs, had their origin in the German carbolineum, the timber preservative, which was based on products obtained in the distillation of coal tar and was insoluble in water. By a process of either chemical or physical emulsification, the active ingredients are converted into a form that, on dilution with water, produces a milky-white emulsion suitable for tree sprays. It is essential that on dilution with water no separation of an oily film shall take place, as this would probably injure the cambium layers. The oils used in the manufacture of most of the brands now offered are of the creosote type, boiling somewhere between 170° and 300° C. (370° and 636° F.). It has not yet been determined which particular fractions of the coal tar distillates possess the highest egg-killing properties. Laboratory experiments have shown that emulsified cresylic acid, containing 50 per cent. of the active ingredient, used at 5 per cent. dilution is as effective in destroying eggs of the silk-worm moth [*Bombyx mori*] as an ordinary creosote emulsion containing 50 per cent. active ingredient used at the same dilution. In order to avoid damage to buds and fruit spurs, it is best to use winter sprays of this type during the mid-dormant period, that is, during January, though instances have been recorded where no damage has occurred when they have been applied as late as

March. The tar oil emulsions appear to be effective in destroying the eggs of certain species of Aphids and of *Psylla mali* (apple sucker), but no success has been recorded as yet against Capsid eggs. Where fungus diseases have been prevalent, it is considered preferable, in the present state of knowledge, to supersede tar oil emulsions by lime-sulphur, or at any rate supplement them with a late dormant spraying with the latter. The comparative costs of these sprays are shown, the tar oil emulsions costing £1 2s. 6d. per 100 gals. as compared with 9s. 2½d. for lime-sulphur with a 2 % caseinate spreader.

Lutte contre les parasites des arbres fruitiers par injection de solution dans le tronc.—*Terre vaudoise*, xvii, no. 3, p. 45. Lausanne, 17th January 1925.

A method of injecting poison into the sapwood of tree-trunks as a control for sucking insects is to bore a hole with an awl running slightly downwards into the sapwood. Into this is inserted the stem of a pipe-shaped receptacle in the bowl of which is the poison. After a time (1 to 4 hours according to atmospheric conditions) the apparatus is withdrawn and the hole stopped with a cork. The best time for the process is between the appearance of leaves and the end of June.

Feytaud (J.). **Les traitements insecticides contre la Cochylis et l'Eudémis. La Nicotine.**—*Rev. Zool. agric. & appl.*, xxiii, no. 9, pp. 214–221. Bordeaux, September 1924.

The use of nicotine in France is reviewed, and the three forms in which the product is issued by the State are explained. These are :— (1) " Jus ordinaires " or " jus de tabac," which is simply a decoction obtained from the leaves and stems ; these decoctions are now titrated at 8, 10, 12, 14, 16, 18 and 20 grammes per litre, the price being regulated according to the actual amount of nicotine contained in them. (2) " Extraits," a secondary product obtained by distillation of the decoction described above, from which the alkaloid, separated from the organic acids by the action of a base, is combined with sulphuric acid to form nicotine sulphate ; this is always issued at a concentration of 500 grammes per litre. (3) " Jus renforcés," obtained by the addition of extrait to " jus ordinaire," and titrated uniformly at 40 grammes per litre.

The best effect against the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] is obtained by the use of Bordeaux mixture containing 2 per cent. copper sulphate and 1 per cent. unslaked lime (or double the quantity of slaked lime) to which is added the amount of extract or of tobacco decoction necessary to ensure a dose of 133 grammes of pure nicotine per hectolitre. This should be applied to the inflorescences or fruit at the period of oviposition ; in this manner the deposition of a certain number of eggs and the hatching of others is prevented and the poisoning of the food of the young larvae that succeed in hatching is ensured. Two applications should be given, one against each generation of the moths ; the suitable dates in Gironde are about 25th May and 20th July.

VOUKASSOVITCH (P.). **La polyphagie chez la Pyrale de la Vigne** (*Oenophthira pilleriana*, **Schiff.**).—*Rev. Zool. agric & appl.*, xxiii, nos. 9 & 10, pp. 201–214 & 234–238. Bordeaux, September & October 1924. [Received 9th January 1925.]

The author has made a further study [*R. A. E.*, A, xi, 493] of the food-plants on which the vine Pyralid, *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., can subsist and develop. A list is given of plants of all kinds on which this moth has been found to feed, with an account of artificial rearings in the laboratory. Experiments showed that the larvae do not in general exhibit any marked preference for any particular plants; herbaceous plants, shrubs, or even trees growing in the vicinity of vineyards can act as temporary food-plants or even as exclusive food-plants, but they are only attacked in proportion to the degree of infestation in the vineyard itself. It has been stated that *S. pilleriana* is not only a vine pest, but that it also attacks lucerne, a species of clover [*Trifolium incarnatum*], vetch and roses. The author, however, has not found fields of clover or lucerne, or any other suitable plant, either adjacent to or far from vineyards, to be heavily infested with the moth. On the contrary, any infestation that occurs in fields removed from vines quickly dies out. In his opinion, the vine is the only plant offering all the necessary conditions for increase, and the rôle of other plants in an already infested area seems to be almost negligible, though in an organised co-operative campaign against this pest the presence of these alternative food-plants must be taken into consideration. They are also dangerous as disseminators of the pest into fresh localities. It is considered probable that *S. pilleriana* lived originally on a number of plants, without reaching excessive numbers, but found on the vine particularly favourable conditions, so that heavy infestations resulted. With time, however, the moth has become adapted to the vine to such an extent that it cannot return to its original régime.

FAURE (Jean C.). **Etudes sur la ponte et mode de nutrition chez** *Pteromalus variabilis*, **Ratz. et** *Eurytoma appendigaster*, **Dalm., Chalcidiens parasites de l'** *Apanteles glomeratus*, **L.**—*Rev. Zool. agric. & appl.*, xxiii, no. 10, pp. 225–233. 2 figs. Bordeaux, October 1924. [Received 9th January 1925.]

Further studies have been made of the method of feeding by means of a suction tube constructed from the body of the host within its cocoon by certain Chalcid parasites [*R. A. E.*, A, x, 86; xii, 231]. The method is described by which *Pteromalus variabilis*, Ratz., and *Eurytoma appendigaster*, Dalm., construct tubes for the purpose of feeding on the host cocoon of *Apanteles glomeratus*, L.; the method of oviposition is also described. A consideration of similar records indicates that this method of feeding must be fairly common among Hymenoptera attacking hosts encased in a cocoon, though it does not seem to be essential.

FEYTAUD (J.). **Le Pyrèthre.**—*Rev. Zool. agric. & appl.*, xxiii, no. 10, pp. 238–243. Bordeaux, October 1924. [Received 9th January 1925.]

Since the value of Dalmatian pyrethrum, *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium*, has been recognised and the importance

of growing an equally good product locally has been demonstrated, the cultivation of the plant and the manufacture of the powder have been undertaken in Switzerland, Spain and the south-east of France. This plant is much more effective as an insecticide than Persian or Caucasian pyrethrum, *C.* (*P.*) *roseum* and *C.* (*P.*) *carneum* (the powder from which is frequently sold under the same label), and all of these are quite distinct from the African or German pyrethrum, produced from *Anacyclus pyrethrum* and *A. officinarum*, of which the root only is used, for medicine and in the preparation of dentifrice. The cultivation of the plant and the preparation of the insecticide are described [*R. A. E.*, A, xii, 10], as well as the effect of the insecticide on the larvae of *Pieris brassicae*. The poison acts on the nerves and muscles of insects and lower vertebrates, causing paralysis, but seems to have no effect on warm-blooded vertebrates. It is used in the form of either powder or emulsion. Experience has shown that only powders of known origin and age can be depended upon, and this practically means that the pyrethrum should be grown in the district in which it is required.

Feytaud (J.). **Sur l'emploi de la chloropicrine contre les Vrillettes.**—*Rev. Zool. agric. & appl.*, xxiii, no. 10, pp. 243–244. Bordeaux, October 1924. [Received 9th January 1925.]

Anobium hirtum was found to have been damaging portfolios containing valuable documents, and as carbon bisulphide was considered too dangerous, the author experimented with chloropicrin. The documents were placed in a large zinc-lined receptacle and were fumigated for 24 hours at a dosage of about 1 oz. per 52 cu. ft. All the insects were killed, and the documents were not injured. Tests were made in the laboratory with different kinds of ink and printing and with coloured plates, none of which was damaged by the fumes. It seems certain, therefore, that chloropicrin can advantageously be substituted for carbon bisulphide for the disinfection of books and documents; in the light of recent observations it is hoped that it will also prove to be a bactericide, in which case it would probably be used for the periodical disinfection of books in public libraries.

Baillargé (E.). **Un ennemi de l'Artichaut, l'*Apion carduorum*, Kirby.**—*Rev. Zool. agric. & appl.*, xxiii, no. 11, pp. 269–272. Bordeaux, November 1924.

Artichokes [*Cynara*] in Charente (France) were found in May 1923 to be infested with the weevil, *Apion carduorum*, Kirby, the larvae of which attack not only the midribs of the leaves of artichokes but also the stems of *Cirsium arvense* and *Carduus acanthoides*. The larva makes longitudinal mines in the leaves of artichoke, in which it pupates, the adult remaining in the mine for a few days before emerging. The life-cycle from egg to adult does not require more than a month. The attack begins with the lowest leaves, which show discoloured patches and finally decay, and gradually progresses up the plant. Artichokes should be carefully watched from early May to the end of June, and any infested leaves should be removed and burnt. If infestation still occurs, the stems and leaves should all be cut down and burnt as soon as the crop has been gathered.

ARMET (H.). **La lutte contre la Cochylis et l'Eudémis.**—*Progr. agric. & vitic.*, lxxxiii, nos. 1 & 2, pp. 18–22 & 36–40. Montpellier, 4th & 11th January 1925.

The vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] seem to have a predilection for certain vine-growing regions of France, while other parts seem to be immune or to experience severe infestations only at long intervals of time. It is remarkable also that these immune regions are very seldom troubled by mildew and *Oidium*; in fact there appears to be a certain correlation between these cryptogamic invasions and those of the vine moths and also of the vine Pyralid, *Sparganothis pilleriana*. For example, the years 1910 and 1915 were disastrous to French vineyards in respect of both intense attacks of fungi and severe infestations of the vine moths. The majority of varieties of vines that have proved susceptible to mildew are also very liable to attack by the moths, and the same correlation holds good for resistant varieties. The probable explanation of this is discussed, temperature and humidity possibly playing the most important part in providing favourable or unfavourable conditions, while vines weakened by either insects or fungi are naturally predisposed to attack by the other. Moreover, the most critical period of the vine's growth with regard to mildew attack is just before, or simultaneous with, flowering, and this is also the moment when the first generations of *C. ambiguella* and *P. botrana* appear.

The actual damage to the grapes is discussed, as well as the seasonal history of the moths. In the case of some early-developing varieties of grape, or after a very warm spring, which favours rapid growth, it often happens that the webs in which the larvae have enveloped the flowers or the young, infested fruit, stretch and burst and the larvae die while trying to repair them. It might be worth while therefore to hasten the growth of the vine by the use of fertilisers or other stimulants.

Since the worst attacks of mildew and the important first generation of moths appear at the same time, it is obvious that treatments should be directed against both together. Pyrethrum added to a fungicide is very promising in this respect, but its cultivation in France requires to be practised on a much larger scale to meet the demand. The author has found that potassium permanganate, which is frequently used as a fungicide against *Oidium*, is a very efficient and cheap remedy for vine moths. The results obtained by the use of copper sulphate with the addition of permanganate against *Oidium* suggest that 1½ lb. potassium permanganate per 100 gals. water sprayed on the eggs of the vine moths, or on the young larvae before they have become enveloped in their web, will destroy them; this strength should not be exceeded or scorching of the foliage will result. A spray is therefore recommended consisting of 100 gals. of neutral Burgundy mixture to which is added 1½ lb. potassium permanganate, and, if desired, 20 lb. of strong "sylvinite" or 10 lb. potassium sulphate, which stimulates the growth of the vines. Treatment should be given immediately after the maximum oviposition of the first generation, which takes place 5 or 6 days after the maximum flight of moths, and before the eggs have hatched (this is generally in the latter half of May for the south of France), and should be repeated a fortnight later.

The branches of the vine should be brushed over after pruning in order to destroy the pupae; the wash recommended for this consists

of 30 per cent. of iron (ferrous) sulphate, 10 per cent. ammonium sulphate, and 10 per cent. strong " sylvinite " (or 5 per cent. potassium sulphate). Besides stimulating growth, this is much cheaper than hot water treatment or scraping the bark and will probably prove as efficient. The chemical reactions that occur and render this mixture toxic are discussed.

The summer generations of the vine moths (the second of *C. ambiguella* and the second and third of *P. botrana*) are very difficult to control ; if they are numerous (and this can be foreseen by studying the flight of moths from 1st to 10th July and from 15th to 25th August), repellent treatments might be tried, using nicotine solutions, dusts of lime or other finely powdered products, or neutral Burgundy mixture with 1 per cent. of sodium nitrate or ammonium sulphate and 2 per cent. strong " sylvinite." These treatments should be given immediately after the oviposition period of these generations, that is, in the second half of July and end of August. Bait and light traps against the adults give some measure of success. Early gathering of the grapes from heavily infested vines will reduce the loss from the third generation of *P. botrana* and destroy most of the larvae of that generation.

DU BUYSSON (H.). **Observations biologiques sur** *Tenebrio molitor*, **L., et** *Dermestes bicolor*, **Fabr.**—*Rev. scientif. Bourbonnais*, 1924, no. 4, pp. 200–201. Moulins, December 1924.

While collecting *Dermestes bicolor*, F., from a pigeon-loft, the author found some larvae of *Tenebrio molitor*, L., and placed these in the same rearing jar. About 3 weeks later, on examining the contents of the jar, only 3 or 4 larvae of *D. bicolor* remained, while those of *T. molitor* were very well developed. Although *T. molitor* presumably lives as a rule on the débris of the straw in such places, the larvae had undoubtedly in this instance devoured those of *D. bicolor*.

PERRET-MAISONNEUVE (—). **Le Pou des Abeilles.**—*L'Apiculteur*, lxix, no. 2, pp. 34–37, 1 fig. Paris, February 1925.

Braula coeca is a much more important pest of bees than is generally supposed. It is said to have been introduced into France with Italian bees, and this variety is the one the most affected by it. This parasitic fly sometimes appears in colonies that are in good condition, but is generally found in weakened colonies with old queens, and when oviposition becomes insufficient, the cause may frequently be traced to the presence of the parasites on the queen. According to Marboud these parasites spend the winter on the queens and other bees ; they become rarer in the spring, many of the infested bees carrying them outside the hive on their bodies and then dying, the parasites dying shortly after their host. In early June they begin to deposit their pupae exclusively on the queens underneath the wings, and then attack the workers throughout the hive while the pupae are transforming, subsisting on the bees and not on honey as is frequently supposed. Their continual attacks exhaust the queens, which eventually die.

The best preventive is to have only strong colonies with young queens, and to keep the hives thoroughly clean. A very good preventive is to

paint the queens with coloured varnish (the underside of the thorax being the spot preferred for infestation by the parasite); this glues down the hairs and prevents the parasite from clinging to them. The author has never seen a queen infested after this treatment, and even if applied after infestation, it seems to rid the queen of the pest, probably owing to the odour of the varnish.

Certain curative treatments recommended by other authors are quoted. Infested queens may be rid of their parasites by picking them up and blowing a few puffs of tobacco smoke on them, when the parasites fall off and should be allowed to drop on to paper in which they can be burnt. Similar fumigation measures will destroy many of the parasites in the hive itself, and they should be repeated two days later, and a third time if necessary. The queen should be carefully watched for a fortnight, and if she does not resume normal oviposition (which is frequently the case after parasitisation), she should be replaced by another.

[Baranov (N.).] **Баранов (Н.). Паразитна мува** (*Blaesoxipha lineata*) **мароканског скакавца** (*Dociostaurus maroccanus*). [A Fly parasitic on the Moroccan Locust.]—*Glasnik Minist. Poljoprivrede i Voda*, ii, no. 7, pp. 40–52, 20 figs. Belgrade, November 1924.

Observations in 1922 in Montenegro showed *Dociostaurus maroccanus*, Thunb., to be infested by the larvae of *Blaesoxipha lineata*, Fall. When the flies were first observed in 1923, on the 20th May, they paid no attention to locusts, even when coming into immediate contact with them, and only after 4th June, when they had become sexually mature, did they attack locusts. They disappeared about 12th June, when nearly all the locusts had been parasitised.

These flies have not been found anywhere except amongst locust swarms. Observations in captivity, where the flies were successfully fed on syrup, showed that the larvae may be placed on any part of the locust body, and that sometimes the locust succeeds in removing a larva by means of its front legs.

Experiments with artificial infestation of locusts by the fly larvae taken from the dissected uterus and transferred by means of a needle to a locust proved very successful and very easy to do. In the laboratory, an infested locust dies within 4–6 days, while in the field such locusts become an easy prey to enemies, such as *Sphex*, *Decticus* and Asilids. When a locust infested by a fly larva is paralysed by *Sphex* the larva of the latter completes its development while that of the fly dies without pupating.

The ease with which this fly may be kept in captivity and the locusts artificially infested with it suggests the possibility of keeping locusts down by releasing parasitised individuals amongst the swarms.

Oedipoda coerulescens, L., and *Calliptamus italicus*, L., have been found parasitised by other species of *Blaesoxipha*, not named specifically.

Other enemies of *Dociostaurus maroccanus* in 1923 were *Epicauta verticalis*, Ill., *Sphex subfuscatus*, Dall., *Myrmecocystus viaticus*, F., *Mylabris* (*Zonabris*) *floralis*, Pall., *Asilus* sp., *Dasypogon* sp., *Decticus verrucivorus*, L., *D. albifrons*, Cyr., and *Ephippiger limbatus*, Fisch.

The life-history of *B. lineata* is illustrated by figures of morphological details of all stages.

Malenotti (E.). **La lotta contro le malattie dell'olivo e la nuova legge sull' olivicoltura.** [Measures against the Diseases and Pests of the Olive and the new Italian Law on Olive Cultivation.]—*L' Italia Agricola*, separate, 15 pp., 14 figs. Piacenza, 15th December 1924.

After a brief account of the measures needed against the fungous diseases and the insect pests affecting the olive in Italy mention is made of the proposed law compelling co-operation among growers in the application of control.

The pests dealt with are *Saissetia oleae*, associated with sooty fungus, and an ant, *Camponotus ligniperda* var. *pubescens*, which tends it, *Prays oleellus* (olive moth), *Phloeotribus scarabaeoides*, Burm. (olive beetle), *Phloeothrips oleae*, Costa, and *Dacus oleae*, Rossi (olive fly). The measures advocated are those that are already recognised as reliable.

Sala y Pons (C.). **La** *Entomophthora aphidis* **(Hoffmann) recogida en Cornellá (Barcelona). Estudio morfológico y biológico de este hongo y especialmente de su poder insecticida.** [*E. aphidis* found at Cornellá (Barcelona). A morphological and biological Study of this Fungus and especially of its insecticidal Power.]—*Butll. Inst. Catalana Hist. nat.*, iv, no. 8, pp. 164–170, 3 figs. Barcelona, November 1924. [Received 7th February 1925.]

Aphis sp. infesting *Chenopodium ambrosioides* near Barcelona was found to be infected with a fungus which seems identical with *Entomophthora aphidis*. The infection amounted to an epidemic, due probably to the moisture in the locality and to carriage by flies. Attempts at artificial infection gave very poor results.

Kozikowski (A.) & Nunberg (M.). **Z biologji kornika** *Phloeosinus thujae* **Perris.** [Biological Notes on *P. thujae*.]—*Polskie Pismo ent.*, iii, pt. 4. pp. 134–137, 3 figs. Lemberg, 1925. (With a Summary in German.)

Phloeosinus thujae, Perris, considered by many authors to be a South European species, is recorded from Poland, *Juniperus communis* being common in the locality. It could not be found on *Thuja*, from which it has been recorded in France.

Kovačević (Z.). **Suznik kukavičji i gubar te njihovi parasiti.** [Parasites of *Malacosoma neustria*, L., and *Porthetria dispar*, L.]—*Sumarski List*, xlix, pt. 1, separate, 5 pp. Zagreb, 1925.

An account is given of the occurrence of *Porthetria* (*Liparis*) *dispar*, L., *Nygmia phaeorrhoea*, Don. (*Liparis chrysorrhoea*, L.) and *Malacosoma neustria*, L., in Jugo-Slavia. Large numbers of these pests are destroyed by natural enemies. The Ichneumonids, *Pimpla instigator*, F., and *P. examinator*, F., attack both *Porthetria dispar* and *Malacosoma neustria*. The latter is also attacked by the Ichneumonid, *Theronia atalantae*, Poda, and the Chalcids, *Monodontomerus aereus*, Wlk., and

Dibrachys omnivorus, Wlk. Other parasites of *P. dispar* are the Ichneumonid, *Barylipa perspicillator*, Grav., and the Braconid, *Apanteles glomeratus*, L.

WAHL (B.). **Bericht über die Tätigkeit der Bundesanstalt für Pflanzenschutz in Wien in den Jahren 1921 bis 1923.** [Report on the Work of the Federal Institute for Plant Protection in Vienna in the Years 1921–1923.]—*Zeitschr. landw. Versuchswesen in Deutsch-österreich*, xxvii, pp. 27–74. Vienna, December 1924.

In 1921 the weevil, *Otiorrhynchus velutinus*, Germ., which does not appear to have been known as a pest of vines and is recorded by Reitter from grass land, injured the eyes on the stocks. The sawfly, *Janus compressus*, F., oviposited in the shoots of pear trees, which were destroyed by the larvae. In one instance apple was attacked in the same way. Red clover and lucerne were much damaged by *Illinoia* (*Acyrthosiphon*) *pisi*, Kalt. Bean leaves and pods were attacked by the red mite, *Tetranychus telarius*, L. (*Epitetranychus althaeae*, v. Hanst.). The beet pests were *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., of which there was a serious outbreak, and the weevils, *Cleonus piger*, Scop., and *Bothynoderes punctiventris*, Germ.

Insect pests were less noticeable in 1922. Some of those observed on beet were *Cassida nebulosa*, L., *Euxoa* (*Agrotis*) *segetum*, Schiff., and *Scotogramma* (*Mamestra*) *trifolii*, Rott. *L. sticticalis* only occurred sporadically.

The seed crop from timothy grass [*Phleum pratense*] failed owing to attack by the flies, *Amaurosoma flavipes*, Fall., and *A. armillatum*, Zett. The eggs are laid on the upper surfaces of the leaves, and in late May or early June the newly-hatched larvae begin feeding in the ears. After feeding for about 3 weeks the larvae remain for a short time in the sheath and then pupate in the ground.

The year 1923 was remarkable for an outbreak of the larvae of *Bibio*, which attacked the germinating seeds of summer cereals. Beet weevils such as *Bothynoderes punctiventris*, *Otiorrhynchus ligustici*, L., *Cleonus piger*, and *Tanymecus palliatus*, F., were in evidence. Fruit-tree pests included *Cheimatobia brumata*, L., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Eriosoma lanigerum*, Hausm., *Scolytus* (*Eccoptogaster*) *rugulosus*, Ratz., and *Porthetria* (*Lymantria*) *dispar*, L. The occurrence of *Eriosoma* (*Schizoneura*) *ulmi*, L., on the roots of *Ribes* spp. was remarkable. *Polychrosis botrana*, Schiff., was the predominant vine-moth. *Asterolecanium fimbriatum*, Ckll., occurred on ivy, and *Orthezia insignis*, Dougl., on *Strobilanthus glomeratus*. Bean samples were infested with the imported Bruchids, *Spermophagus subfasciatus*, Boh., and *Bruchus* (*Bruchidius*) *obtectus*, Say.

Both Urania green and a mixture of lime and copper sulphate proved of practical value against *Byctiscus betulae*, L., attacking vines. Against the vine-moths, *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Sturm's preparation of arsenic proved more effective than Urania green.

In investigations on banding material it was found that the paper on which the adhesive is spread has a marked influence on its durability; a very absorbent paper reduces the stickiness and durability of the material. A non-absorbent paper is therefore essential, apart from the protection it affords the bark.

Wilke (S.). **Ueber Lebensdauer und Fortpflanzung des Getreidelaufkäfers, *Zabrus tenebrioïdes* Goeze.** [The Length of Life and Reproduction of *Z. tenebrioides*.]—*Zeitschr. wiss. Insektenbiol.*, xix, no. 10, pp. 257–261. Berlin, 30th December 1924.

These observations are based on the behaviour of a number of specimens of *Zabrus tenebrioides*, Goeze, obtained in August 1923, and divided into two batches, one kept indoors and the other in metal cylinders placed in an experimental field. No eggs were deposited in autumn, so that it was thought that all the eggs had been laid previously, and that most of the individuals would die, but a count made in April 1924 showed that only about half the number in the laboratory batch had done so. Of the outdoor batch about one-third had survived. On the 2nd July 1924, 5 beetles remained of the original laboratory batch of 38, and with them were found 24 eggs and 20 young larvae. The results with the outdoor batch were similar.

The behaviour of a number of beetles received in August 1924 from the same district was different, oviposition occurring shortly afterwards in the case of some of the females.

The adult of *Z. tenebrioides* can therefore live into the following year and is capable of reproduction then, as well as in the year of its emergence.

Donner (M.). *Potosia cuprea* **Fabr. als Obstschädling.** [*P. cuprea*, a Fruit Pest.]—*Ent. Jahrb.*, xxxii, pp. 115–116. Leipzig, 1923.

The adult of the Cetoniid rose beetle, *Potosia cuprea*, F., is recorded as boring into pear fruits, but it is not known if this attack follows an existing injury.

Pfankuch (K.). **Schlupfwespen an Stachelbeersträuchern fliegend.** [Parasitic Hymenoptera flying on Gooseberry Bushes.]—*Ent. Jahrb.*, xxxii, pp. 130–137. Leipzig, 1923.

The larvae of sawflies, especially *Pteronus ribesii*, Scop., infesting gooseberry bushes in Germany, were found to be parasitised by the Ichneumonids, *Erromenus calcator*, Müll., *Perilissus limitaris*, Grav., *Mesoleius grossulariae*, Ratz., and *Mesochorus confusus*, Holmg. The presence of the parasites sometimes disclosed an infestation by the sawfly that had previously been overlooked.

Lindinger (L.). **Einführung in die Kenntnis der deutschen Schildläuse.** [An Introduction to the Knowledge of German Scale-insects.]—*Ent. Jahrb.*, xxxii, pp. 138–152, 1 pl. Leipzig, 1923.

The title explains the scope of this paper, which contains keys to the subfamilies, genera and species of Coccids found in Germany.

Hering (M.). **Oligophagie bei Blattminierern und ihre Verwendungsmöglichkeit zur Lösung pflanzenverwandschaftlicher Probleme.** [Oligophagy in Leaf Miners and the Possibility of using it to solve Problems of Plant Relationship.]—*Ent. Jahrb.*, xxxiii–xxxiv, pp. 81–88. Leipzig, 1924.

It is suggested that the limitation to a few food-plants noticed in certain leaf-mining insects (which are usually strikingly monophagous in the larval stage) may prove of value in tracing the relationship between various plants, and instances are given in support of this.

Reum (W.). **Insekten und andere Tracheaten als menschliche Nahrungsmittel.** [Insects and other Tracheates as human Food.]—*Ent. Jahrb.*, xxxiii–xxxiv, pp. 89–92. Leipzig, 1924.

A brief account is given of the various kinds of insects sometimes used as food by man.

Priesner (H.). **Die Winterquartiere der Thysanopteren.** [The Winter Quarters of Thysanoptera.]—*Ent. Jahrb.*, xxxiii–xxxiv, pp. 151–162. Leipzig, 1924.

A list of European Thysanoptera grouped according to their hibernating habits is given.

Lindinger (L.). **Die Schildläuse der mitteleuropäischen Gewächshäuser.** [The Scale-insects of Central European Greenhouses.]—*Ent. Jahrb.*, xxxiii–xxxiv, pp. 167–191. Leipzig, 1924.

This review of the Coccids found in greenhouses in Central Europe contains keys to the subfamilies, genera and species. A list is given of the species, with their distribution and regions of origin. They are divided into two categories: those found in hothouses and those in unheated greenhouses.

Rensch (B.). **Eine neue Methode zur Bekämpfung der Rübennematoden.** [A new Method for combating Beet Nematodes.]—*Mitt. Dtsch. Landwirtschaftges.*, 1924, pp. 412–414. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxiii, no. 9–17, pp. 335–336. Jena, 10th January 1925.)

Baunacke found that Nematodes are attracted to the roots of beet by secretions from them. The author has found synthetic materials that exercise the same effect. His preparation "A" is obtained from various roots, while "B" occurs when vegetable plasmas decompose in the soil. Both were produced with the co-operation of the plant pathology division of the Schering chemical works at Berlin. A weak solution (0·025–0·05 per cent.) of either has given good results, while a combination of both was even better. The solution is used in the soil in autumn after the harvest. The Nematode larvae are thereby enticed out of the cysts and perish, as no roots susceptible of infestation are available. The best effect is obtained after a cereal crop, and not after the sugar-beet crop, because the larvae do not emerge at soil temperatures under 6° C. [42·8° F.]. Good results can also be obtained in spring and summer if the material is used on plants that are immune from infestation by Nematodes (potatoes, rye, etc.), or only slightly attacked (wheat, peas, etc.), as in these cases also they die for lack of food. This method is likewise effective when beet is being sown, because the larvae fail to find the beets owing to the ground being drenched with the attractant.

Müller and Molz have drawn attention to the beneficial effect obtained by planting chicory in ground infested by Nematodes. The author considers this to be due to the attraction exercised by the secretions of the roots of this plant, which, however, contain a bitter principle that renders it almost immune from infestation.

ESCHERICH (K.). **Die Uebertragung der Drahtwürmer durch Waldstreu.** [The Carriage of Wireworms by means of Forest Litter.]—*Anz. Schädlingskunde*, i, no. 1, pp. 2–4, 2 figs. Berlin, 15th January 1925.

Independent investigations on the fauna of forest litter show large numbers of wireworms in this material. Caution is therefore necessary in using it as a manure.

EIDMANN (H.). **Der Harzzünsler und seine forstliche Bedeutung. Vorläufige Mitteilung.** [*Dioryctria splendidella*, H.S., and its Importance in Forests. Preliminary Note.]—*Anz. Schädlingskunde*, i, no. 1, pp. 5–8, 3 figs. Berlin, 15th January 1925.

Very little has been published on *Dioryctria splendidella*, H.S., which occurs chiefly on pines, though spruces may be attacked. These studies were made in a stand of Weymouth pine [*Pinus strobus*] in Germany. The caterpillar is one of the few that live in the bast. It is found high up in trees infected with fungous diseases, the injured places observed being about half way up the stem and always near a branch whorl. The exudation of resin is somewhat similar to that caused by *Dendroctonus micans*, Kug.

The adult moth flies at the end of July and in August and probably oviposits near resinous patches. The duration of incubation is not known. The larva bores into the bark, and the mine is nearly filled with resin and excreta. Early in October the larva prepares an oval chamber which is lined with a web, hibernates there, and pupates in the following spring without feeding again. Thus there is one annual generation, though there may be a second in hot years, in which case the larvae of the second generation feed in the spring. A Tachinid, *Actia pilipennis*, parasitises the larva, probably attacking it while it is boring into the bark. The economic importance of *D. splendidella* is not very great, but as it feeds on resin, it may prove harmful by keeping open resinous wounds.

VON VIETINGHOFF-RIESCH (A.). **Kieferneule und Vogelwelt.** [The Pine Moth and Birds.]—*Anz. Schädlingskunde*, i, no. 1, pp. 8–10. Berlin, 15th January 1925.

This article discusses the relations between birds and the pine moth [*Panolis flammea*] and records an instance where tits and jays effectively protected a stand of trees from serious injury.

ELSNER (J.). **Der Coloradokäfer.** [The Colorado Beetle.]—*Badische Bl. Schädlingsbekämpfung*, i, no. 3–4, pp. 25–30, 2 figs. Freiburg i. Br., December 1924.

An account is given of the occurrence of the Colorado potato beetle [*Leptinotarsa decemlineata*] in France. This pest appeared in Germany in 1877, 1887 and 1914, but on all three occasions it was exterminated by the measures adopted.

SCHUSTER (W.). **Beobachtungen aus dem Maikäferflugjahr 1924 im Bodenseegebiet.** [Observations during the May Beetle Flight Year 1924 in the Region of Lake Constance.]—*Badische Bl. Schädlingsbekämpfung*, i, no. 3–4, pp. 30–38. Freiburg i. Br., December 1924.

In 1924 cockchafers (*Melolontha*) were abundant in the region of Lake Constance, and their flight-period was of long duration, lasting from April to July. Stone-fruit trees suffered the chief injury on the first appearance of the pests, and a serious loss of crop resulted. Later deciduous trees were severely attacked, especially oaks. In the region of Lake Constance outbreaks are based on a three-year-generation, the beetles being rare in the intervening years. *M. melolontha* (*vulgaris*) was the predominant species, *M. hippocastani* being seldom met with. Beetles that attempted to fly across the lake only succeeded in reaching a distance of 1,100–1,650 yards from the shore.

FAGNOUL (F.). **Entomologie und Gesetzgebung.** [Entomology and Legislation.]—*Badische Bl. Schädlingsbekämpfung*, i, no. 3–4, pp. 57–62. Freiburg i. Br., December 1924.

The text is reproduced of various orders, regulations and decrees promulgated in Germany, mostly in 1924, and directly or indirectly connected with entomology. Some are directed against insect pests, such as those against *Leptinotarsa decemlineata*, while others aim at protecting insect life.

TRÄGÅRDH (I.). **Trägnagare-Studier.** [Studies on Anobiids.]—*Medd. Stat. Skogsförsöksanst.*, xxi, no. 8, pp. 311–338, 16 figs. Stockholm, 1924. (With a Summary in German.)

Observations on species of *Ernobius* in Sweden support the view that the importance of Anobiid beetles as forest pests has been overestimated.

E. mollis, L., breeds in spruce attacked by *Pissodes* and other bark-beetles, especially in the lowest parts, which are not attacked by *Ips typographus*, L. The larvae mine the sapwood beneath the bark. Forest conditions are therefore somewhat unfavourable to the beetle, but it can increase if timber with its bark on is stored, the presence of the bark being essential.

E. explanatus, Mnnh., in forests attacks spruce in a similar manner, but it is not known whether it can attack stored timber.

E. nigrinus, Strm., attacks the shoots of *Pinus* spp., but only such dry branches as often occur in the lower parts of the crowns after infestation by *Myelophilus piniperda*, L., and *M. minor*, Hrtg.

Though much has been written on the biology of *E. abietis*, F., the injury it does has not been fully investigated. Holste regards the young larvae as destroyers of spruce seeds [*R. A. E.*, A, ix, 607], but examination in Sweden failed to reveal any infestation, either in summer or in winter, in young cones. The author considers *E. abietis* to be a specific infestant of cones that have dried and have released their seed. The eggs are laid on the cones on the tree, but larvae and adults are found only on fallen cones, evidently because cones fall early as a result of infestation. Thus *E. abietis* can scarcely be held to be a pest, at least in Sweden.

E. angusticollis, Ratz., has been recorded as a pest of spruce cones. In Sweden it was bred from spruce buds and not from the cones, and

it would seem that the infestation occurs after the buds are dead and dry. It is not certain whether this species lives normally in the buds or in the cones, but there are no records of its being found in cones since Ratzeburg's observation 80 years ago.

Mordvilko (A.). **On the Theory of Plant Lice Migrations.**—*C.R. Acad. Sci. Russ.*, 1924, pp. 141–144. Leningrad, 1924.

The author previously considered the migration of Aphids to have been derived from their original polyphagous habits, but further study of this question has shown this theory to be only applicable to certain forms. It would now appear that with the evolution of vegetation certain Aphids migrated to the new plants, this being possible for the summer generations; whereas the stem-mothers, being less adaptable, could only exist on the original food-plants, thus forcing a return of the migrants. No single rule can be laid down, however, to explain the migration of different Aphids as was at first supposed.

John (O.). **Ein neuer *Haplothrips* aus Ferghana nebst Verzeichnis der bisher in Russland gefundenen Thysanopteren.** [A new *Haplothrips* from Ferghana and a List of the Thysanoptera hitherto found in Russia.]—*Ent. Mitt.*, xiv, no. 1, pp. 17–25. Berlin, 15th January 1925.

Haplothrips mordvilkoi, sp. n., is described from females and larvae taken on *Arthrophylum heloxylon* in Ferghana, and a list is given of the species of thrips recorded in European and Asiatic Russia.

Cultivation, Diseases and Insect Pests of the Hop Crop.—*Minist. Agric. & Fisheries*, Misc. Pubn. no. 42, 82 pp., 69 figs. London, January 1925. Price 2*s.* 6*d.*

In the section (pp. 59–81) dealing with insect pests of the hop, contributed by F. V. Theobald, an account is given of the bionomics of each, with brief recommendations for control. Few of them are of more than local or occasional importance; the three chief ones are *Phorodon humuli*, Schr. (hop aphis), various wireworms and *Tetranychus telarius*, L. (*althaeae*, v. Hanst.) (red spider). The Cecidomyiid, *Diplosis humuli*, Theo. is often very harmful locally, as also are the flea-beetles, *Plectroscelis concinna*, Marsh., and *Psylliodes attenuatus*, Latr. Two species of Nematodes, *Heterodera schachtii*, Schmidt, and *Tylenchus dipsaci*, Kühn, are numerous on the roots and must hasten decay in the stocks, even if they do not cause it. Other insects dealt with include the bugs, *Calocoris fulvomaculatus*, DeG., *Anthocoris confusus*, Fall., *A. nemorum*, L., and *Euacanthus interruptus*, L. (hop frog fly); the weevils, *Otiorrhynchus singularis*, L. (*picipes*, F.), *O. sulcatus*, F., and *Liophloeus nubilus*, F.; *Melolontha melolontha*, L. (*vulgaris*, F.); *Rhizotrogus solstitialis*, L.; *Vanessa c-album*, L., and *V. io*, L.; *Hepialus humuli*, L.; *Dasychira pudibunda*, L.; *Smerinthus ocellatus*, L.; *Amphidasys betularia*, L.; *Notolophus* (*Orgyia*) *antiquus*, L.; *Arctornis chrysorrhoea*, L. (*Porthesia similis*, Fuessl.) (gold-tail moth); *Eupithecia assimilata*, Gn.; *Hypena rostralis*, L.; *Acronycta rumicis*, L.; the flies, *Bibio hortulanus*, L., *B. marci*, L., *Dilophus febrilis*, L., *Tipula oleracea*, L., *Pachyrhina maculosa*, Meig., and *Agromyza frontalis*, Meig. (hop leaf-miner); the earwigs, *Forficula auricularia*, L., and *Labia minor*, L.; *Entomobrya nivalis*, L. (springtail); and the millepede, *Blaniulus guttulatus*, Bosc.

THEOBALD (F. V.). **Aphides attacking Vegetables and Market-garden Crops.**— *Jl. R. Hortic. Soc.*, l, pt. 1, pp. 28–45, 23 figs. London, January 1925.

Many of the Aphids recorded are merely of occasional or local importance, only a few being general pests. The remedies for each are very similar, unless especially noted.

Illinoia (*Macrosiphum*) *pisi*, Kalt. (green pea aphis) is often very harmful to peas, and sometimes also attacks broad beans, the alternate food-plant being clover; brushing or shaking the insects off the tips of the plants, spraying with soft soap and quassia, or dusting with nicotine powder are recommended. *Aphis rumicis*, L. (black fly or collier) is a general pest, especially of broad and other beans and sometimes of peas, asparagus, onions, spinach, beetroot, etc., of which it is often necessary to pinch off all the infested tops. *Geoica phaseoli*, Pass. (French bean root aphis) cannot be treated until the beans have been gathered, when the haulms should be pulled and burnt on the beds and the land dressed with 3 cwt. naphthaline per acre, which should be dug in to prevent the alate forms from attacking other plants.

Macrosiphum solanifolii, Ashm. (green and pink potato and rose aphis) is chiefly injurious to potatoes and to tulips under glass. *Myzus pseudosolani*, Theo., frequently attacks sprouting seed potatoes. *M. persicae*, Sulz. (green peach aphis) and *Aphis solanina*, Pass., both occur on potatoes; seed potatoes infested with these species should be put in closed boxes and fumigated with tobacco shreds, or dipped in soft soap and nicotine solution.

Aphids on carrots and parsnips are: *Anuraphis tulipae*, Boy., common on many roots, bulbs and corms; *A. dauci*, F. (*carotae*, Koch), on carrots, generally kept in check by Hymenopterous parasites; *Anuraphis subterraneus*, Wlk. (parsnip root aphis); and *Cavariella capreae*, F., and *C. pastinaceae*, Schr., which are common on willow and osier in spring and early summer and in August migrate to Umbelliferae, on which they occur until autumn.

Brevicoryne brassicae, L. (mealy cabbage aphis) attacks almost any kind of *Brassica*, the injury being most severe in the autumn; all refuse of cabbage plants and all cruciferous weeds should be destroyed, and infestation in seed beds should be promptly treated with sprays of nicotine and soap; waste pepper mixed with road dust is recommended for sprouts.

Amphorophora lactucae, Kalt., is the worst pest of *Ribes* and lettuce, being common on currant and gooseberries (wintering in the egg stage on *Ribes*), and sometimes abundant on lettuce and endive, which are the summer food-plants; *Myzus lactucae*, Schr., is a very similar species with the same food habits; *Macrosiphum sonchi*, L., which occurs on numerous weeds, is chiefly injurious to lettuce and endive in seed; the remedy for these species is to destroy the Aphids on *Ribes* during the winter or spring by spraying with carbolineum emulsions against the eggs or with nicotine-soap against the larvae, and all weeds acting as food-plants should be kept down, as once in the lettuce the insects cannot be reached. *Pemphigus bursarius*, L., winters either on the roots of lettuce and similar plants or in the egg stage on poplars, where galls are formed by the stem-mothers; the galls burst about July, and the alate Aphids fly away and deposit their young on the soil near lettuce roots; these young (the so-called *P. lactucarius*, Pass.) increase rapidly on lettuce roots, perhaps remaining

there all the winter, and alate females may arise from them in late autumn and fly off to poplars, where sexual forms are produced and eggs laid on the buds. When summer lettuces are attacked the insect should be destroyed in the soil, and dead lettuces should not be left rotting in the ground; infested weeds should be pulled up and the ground treated with naphthaline.

On celery, *Aphis apii*, Theo., and *Cavariella capreae*, F., are sometimes very numerous; the soft soap in the spray must be very adhesive (as much as 10 lb. per 100 gals.) in order to stick to the leaves. On cucumbers, melons and marrows, *Aphis gossypii*, Glov., is particularly injurious under glass, and can be controlled by spraying in cucumber houses, but in melon frames is best dealt with by fumigation with tobacco shreds. On Jerusalem artichokes, the root Aphids, *Trama troglodytes*, Heyden, and *T. radicis*, Kalt., may be found in the soil at all times of the year, the apterous forms feeding on the roots of many plants; after artichokes have been lifted, the beds should be dressed with a soil insecticide. *Forda formicaria*, Heyden, sometimes attacks artichokes and has been found on potatoes. On spinach and beetroot, *Aphis rumicis*, L., causes the leaves to crumple up, while *Hyalopterus atriplicis* forms galls on *Chenopodium*, and on beets and spinach causes swollen patches at the sides of the leaves, but is never a serious pest.

Fox-Wilson (G.). **Insect Pests of Rhododendrons.**—*Jl. R. Hortic. Soc.*, l, pt. 1, pp. 46–54, 4 figs. London, January 1925.

A key is given by which the species of insect responsible for damage to rhododendrons may be recognised, and notes are included on the stages, life-history and control of each. They include the leaf feeders, *Cheimatobia brumata*, L. (winter moth); *Odontoptera bidentata*, L. (scalloped hazel moth); *Arctornis chrysorrhoea*, L. (*Porthesia similis*, Fuessl.) (gold-tail moth); *Tortrix podana*, Sc., *T. leacheana*, L., and other species of *Tortrix*; *Otiorrhynchus sulcatus*, F. (vine weevil), *O. singularis*, L. (*picipes*, F.) (clay-coloured weevil), and *Strophosomus coryli*, F. (nut-leaf weevil), these weevils being by far the most injurious pests of rhododendrons; *Stephanitis rhododendri*, Horv. (rhododendron bug); and the root feeders, *Melolontha melolontha*, F. (cockchafers); and, on azaleas, the leaf-miner, *Gracilaria azaleella*, Brants.

Chamberlin (J. C.). **The Citrus Coccidae of the World. An Appeal for Co-operation and Aid.**—*Bull. Ent. Res.*, xv, pt. 3, pp. 281–282. London, January 1925.

A monograph of the *Citrus* Coccidae of the World is being compiled under the auspices of the University of California Citrus Experiment Station, Riverside, Cal. In addition to keys to the species and completely illustrated systematic descriptions, the work is to contain general bionomics, geographical distribution, synonymy, and a complete bibliography. The correlation of the data so far as possible with the distribution and importance of commercial citrus plantings themselves will also be dealt with. In order to fulfil the outlines indicated, the international support and co-operation of entomologists and citrus growers is essential. Particulars are given of the points of importance for the guidance of those who desire to co-operate in this project.

TAMS (W. H. T.). **Descriptions of two New Species of the Genus** *Metadrepana* **(Drepanidae, Lep.).**—*Bull. Ent. Res.*, xv, pt. 3, pp. 289–291, 4 figs. London, January 1925.

The species described are *Metadrepana pallida* from Northern Nigeria and *M. andersoni* from Kenya Colony. The larvae of the latter were recorded as defoliating coffee in 1922 [*R. A. E.*, A, xii, 320]. The wing venation and male genitalia of the genotype, *M. glauca*, Hmpsn., and the male genitalia of the new species are illustrated.

TAMS (W. H. T.). **A New Processionary Moth (Notodontidae) injurious to Pine Trees in Cyprus.**—*Bull. Ent. Res.*, xv, pt. 3, pp. 293–294, 3 figs. London, January 1925.

Thaumetopoea wilkinsoni, sp. n., was reared from larvae causing serious injury to pine trees in Cyprus.

OUDEMANS (A. C.). **Acarologische Aanteekeningen lxxiv.** [Acarological Notes, lxxiv.]—*Ent. Ber. Ned. Ent. Ver.*, vi, no. 136, pp. 249–260. The Hague, 1st March 1924.

Referring to the two hypopial forms of mite found by Schulze [*R. A. E.*, A, xii, 104], the author states that the second one, hypopus II, is not *Tyroglyphus farinae*, L., but *T. farris*, Oud., though it is possible that the latter is a degenerate form of the former.

SCHULZE (H.). **Die Hypopi der Mehlmilbe** *Tyroglyphus farinae* **L. 1758.** [The Hypopi of the Flour Mite, *T. farinae*.]—*Ent. Ber. Ned. Ent. Ver.*, vi, no. 138, pp. 286–292. The Hague, 1st July 1924. [Received 4th February 1925.]

Regarding the preceding paper the author gives her reasons for disagreeing from the view that the second hypopial form found by her is that of *Tyroglyphus farris*, Oud., and not of *T. farinae*, L.

MCKERRAL (A.). **Entomology.**—*Rept. Dept. Agric. Burma, 1923–24*, pp. 14–15. Rangoon, 1924.

With the exception of local outbreaks of flea-beetles and the larvae of *Maruca testulalis*, no serious damage by insects to rice has been recorded during the year. Both the pink boll-worm [*Platyedra gossypiella*, Saund.] and the spiny boll-worm [*Earias insulana*, Boisd.] occurred on cotton, the former causing most damage. Infestation seemed particularly severe in exotic and Cambodia cotton. In the case of the latter, cultivators are asked to destroy all standing plants as soon as the harvest is over, and also any weeds that may harbour the pest throughout the year.

The only other pest of importance recorded is the rhinoceros beetle [*Oryctes rhinoceros*, L.], against which a definite co-operative campaign has been started. Proposals for legislation to control this pest have been placed before the Government.

Templeton (J.). **The Effects of Heat Treatment of Cotton Seed on its Germination and on the subsequent Growth and Development of the Plants.**—*Minist. Agric. Egypt*, Tech. & Sci. Serv., Bull. 48, 9 pp., 3 pls. Cairo, 1924.

The author's summary of this paper is as follows: Germination tests carried out in the laboratory by the Entomological Section and by the author fail to show that the germination of cotton seed subjected to heat treatment in the ginneries [against *Platyedra gossypiella*] is adversely affected. When the seeds are sown singly in pots sunk in the soil in the open, differences are apparent in favour of plants from unheated seeds, with regard to rate and quantity of the so-called " field germination " [a term including both true germination and the subsequent growth that results in the appearance of the cotyledons above ground] and also in the average heights, and the dry weights of the plants, after a period of 63 days. Under normal field conditions, where the seed is sown by handfuls in " holes," and the resulting plants thinned out to two per " hole " the above differences with regard to " field germination " appear to be entirely negligible. Heat treatment of the seed has no apparent effect on the flowering or the yield of the resulting plants.

Zanon (V.). **Nuovo specie di** *Franklinothrips* **(Thysanoptera) rinvenuta a Bengasi.** [A new Species of *Franklinothrips* found at Bengasi.]—*Atti Pontif. Accad. Nuovi Lincei*, lxxvii, pp. 88–96, 3 figs. Rome, 1924.

Franklinothrips myrmicaeformis, sp. n., is described and figured from specimens taken at Bengasi on grape vines, on which it may have been predacious on *Retithrips aegyptiaca*, Marchal.

Vanderyst (H.). **Les Insectes parasites sur l'Elaeis. Note concernant un Parasite des Noyaux.**—*Bull. agric. Congo belge*, xiv, no. 4, pp. 614–619; xv, no. 1, pp. 149–156. Brussels, December 1923 and March 1924. [Received 10th January 1925.]

Previous literature on the pests of the oil palm (*Elaeis guineënsis*) is briefly reviewed [*cf. R. A.E.*, A, ix, 495]. A common and apparently widespread Scolytid infesting this palm in the Belgian Congo has been determined as *Coccotrypes congonus*, Eggers. Its presence is negligible wherever the produce of the palm does not exceed the need of the local inhabitants, but in sparsely populated areas or where for other reasons a large number of the nuts are left on the ground they become heavily infested. Fresh nuts are not attacked, as the beetles cannot pierce the oily pericarp. The natural enemies of *C. congonus* are ants, and an undetermined mite, the latter attacking both larvae and adults. If control measures are necessary, it is sufficient to collect the nuts before the oily pulp has completely disappeared.

Ghesquière (J.). **La maladie des bananiers dans le Bas-Congo.**—*Bull. agric. Congo belge*, xv, no. 1, pp. 171–175. Brussels, March 1924. [Received 10th January 1925.]

Bananas in the lower Congo are attacked by the weevils, *Cosmopolites sordidus* and *Temnoschoita quadripustulata* (*quadrimaculata*). *C. sordidus* has spread since previous records [*R. A.E.*, A, v, 364], and

it is thought that unless active measures are taken it will gradually extend its range throughout the colony. *T. quadripustulata* is an indigenous species and was first recorded on banana at Eala in 1919; it has since been found on oil palm (*Elaeis guineënsis*), *Arenga saccharifera* (introduced sugar palm) and injured *Raphia*. It is a less serious pest of bananas than *C. sordidus*, and infestations by it are always accompanied by the latter or by root infestation with *Heterodera*. For the control of the weevils, burying infested plants at a depth of about 20 in. has been suggested, but is not recommended unless they are buried with a large proportion of lime. The infested parts may be cut up and dipped in boiling water, or if the plantation is near a deep swamp or a river, the infested trunks may be thrown into it.

A list is given of the resistant varieties of bananas and also of the native names of the banana pests.

VAYSSIÈRE (P.) & MIMEUR (J.). **Insectes et Myriapodes récoltés sur les plantes cultivées en Afrique Occidentale française.**—*Bull. Soc. ent. France*, 1924, no. 17, pp. 188–192. Paris, 1924.

This is an annotated list of insects and Myriapods attacking cultivated plants in French West Africa.

VUILLET (J.). **Vers à soie sauvages du Soudan français et de la Haute-Volta.**—*Rev. Bot. app. & Agric. colon.*, iv, no. 40, pp. 835–837. Paris, 31st December 1924.

Brief notes are given on the wild silkworms occurring in the French Sudan and the Haute-Volta and their utilisation by the natives. The species recorded are *Epiphora bauhiniae*, Guér., which spins its cocoon exclusively on wild jujube (*Zizyphus lotus*); *Anaphe moloneyi*, Druce, occurring on *Macrolobium* and *Ormosia laxiflora*, both leguminous plants; and *Hypsoides vuilleti*, Joannis, on tamarind.

COTTERELL (G. S.). **Report of the Entomologist for the Year ending 31st March 1924.**—*Gold Coast: Rept. Agric. Dept. 1923–24*, pp. 34–35. Accra, 1924.

In addition to the pests already mentioned in the previous report [*R. A. E.*, A, xii, 367], *Glenea* sp. attacked a few cacao trees in one locality. The parasite, *Encyrtus cotterelli* [*R. A. E.*, A, x, 527], is recorded from *Sahlbergella*. Two rhinoceros beetles attack coconut palms, *Archon centaurus*, found in the interior, and *Oryctes monoceros*, occurring only along the coast. A considerable number of *Borassus* palms in British Togoland have been killed by *Oryctes* sp., the larvae breeding in the dead trunks. Coconuts in the vicinity are not attacked. A preliminary survey has been made of the cotton pests occurring in British Togoland. *Dysdercus* spp. are common, as much as 30 to 40 per cent. of the cotton being stained. Bollworms are comparatively common, but not serious.

SYMES (C. B.). **Notes on the Black Citrus Aphis.**—[*S. Rhodesia*] *Minist. Agric. & Lands*, Bull. 522, 28 pp., 7 figs, 2 pls. Salisbury, December 1924.

This paper on *Aphis tavaresi*, Del Guer., has already been noticed [*R. A. E.*, A, xiii, 78].

Naude (T. J.). **A new Jassid.**—*S. African Jl. Nat. Hist.*, iv, no. 5, p. 307. Pretoria, September 1924. [Received 27th January 1925.]

Balclutha mbila, sp. n., was taken on maize in Natal. It will probably prove of interest as an agent in transmitting plant diseases of the mosaic type.

Fuller (C.). **The Egg-laying of a Grain Weevil.**—*S. African Jl. Nat. Hist.*, iv, no. 5, pp. 365–366. Pretoria, September 1924. [Received 27th January 1925.]

Notes are given on the method of oviposition of the grain weevil [*Calandra oryzae*].

Lounsbury (C. P.). **Report of the Division of Entomology, 1923-24.**—*Jl. Dept. Agric. Union S. Africa*, ix, no. 6, pp. 556–567. Pretoria, December 1924.

The locust situation during the year ended 30th June 1924 is reviewed, most of the information having been noticed in the monthly reports. Attention is being given to sodium fluoride as a substitute for sodium arsenite in locust poisons [*R. A.E.*, A, xii, 472]. Much trouble has been experienced in inspecting broom corn imported into the South African broom factories for the presence of *Pyrausta nubilalis* (European corn stalk borer). A consignment from central Europe that reached Johannesburg was found to be infested; every effort was made to trace all the insects present, and over 170 were caught in two months and another 51 were found in poison bait tins. Although every precaution has been taken against the insect gaining a foothold in any of the surrounding gardens, etc., it is possible that some individuals may have survived. Under new regulations of the Agricultural Pests Act, no broom corn may now be imported from oversea without the permission of the Department of Agriculture, and then only on condition that it is free from stalks capable of sheltering a borer. Borers, when present, are secreted in the butt of the stalk below the brush of straws.

The present distribution and spread of pernicious scale [*Aspidiotus perniciosus*] are recorded; it is expected that there will be a sudden very great increase in damage from this pest during and immediately following the next season of abnormally heavy rainfall. *Gonipterus scutellatus* (eucalyptus snout-beetle), which has recently appeared in South Africa from Australia, is an important pest of *Eucalyptus viminalis, E. globulus*, etc., and is spreading to a serious extent [*R. A.E.*, A, xiii, 38]. The Coccinellid, *Cryptolaemus montrouzieri*, which is predacious on mealy bugs, has, after a series of failures, now been successfully introduced from California. Attempts to introduce the parasite, *Pimpla roborator*, against the codling moth [*Cydia pomonella*] and the false codling moth [*Argyroploce leucotreta*] do not appear to have been successful. The discovery of *Cylas formicarius* (sweet potato weevil) in Zululand caused some anxiety, but it is now known to have been present in Natal for many years and does not cause much damage unless the sweet potato roots are left unnecessarily long in the ground. Every effort is being made to increase the practice of fumigation of *Citrus* against Coccids, especially [*Chrysomphalus*] *aurantii* and [*Lepidosaphes*] *ficus*, which are both pests of outstanding

importance. The results of introducing the parasite [*Aphelinus mali*] of the woolly aphis [*Eriosoma lanigerum*] from America have been disappointing, the prolonged drought and the heat of early summer being apparently very unfavourable to it.

WILLIAMS (R. H.). **Locust Administration.**— *Jl. Dept. Agric. Union S. Africa*, ix, no. 6, pp. 600–608, 1 map. Pretoria, December 1924.

A map shows the movements of locusts in South Africa during 1923–24, and the administration of the campaign against them is described. During the season, 679,213 gallons of concentrated (33,960,650 gallons of diluted) poison were issued for use against locusts, and 818,425 swarms of hoppers were destroyed in the Union. The success of the campaign was again largely reduced by invasions of flying locusts in May and June from the Kalahari, resulting in heavy egg deposits and the prospect of another very serious outbreak. Two parasites of the locusts, as well as birds, were of great assistance, though the birds had returned north by the time they were most urgently needed. Sweetened poison was chiefly used, but it is desired to find some ingredient less bulky than treacle and less attractive to stock, for use in the bait. The sprinkling of locusts with fine sodium arsenite powder by means of a distributor will be tried largely next season in the Kalahari and South-west Africa; where water is available, this can be used as a spray (3 oz. powder to 4 gals. water). The schedule of operations during the campaign of 1923–24 is appended.

Prickly Pear and Cochineal Insects.— *Jl. Dept. Agric. Union S. Africa*, x, no. 1, pp. 6–7. Pretoria, January 1925.

Experiments that have been made in the past on a small scale with a view to controlling prickly-pear in South Africa by introduced cochineal insects are briefly noticed, and extracts are given from the correspondence between Australia and Africa on the subject. Co-operation between the two countries has been established.

Departmental Activities: Entomology.— *Jl. Dept. Agric. Union S. Africa*, x, no. 1, pp. 8–11 & 16. Pretoria, January 1925.

Several attempts have been made to establish *Cryptolaemus* [*montrouzieri*, Muls.] in South Africa, and colonies have now been liberated at several places in the Cape Province and Natal.

The invasion of beehives by the Argentine ant [*Iridomyrmex humilis*, Mayr] may be prevented by placing mercury bichloride in hollows in the top of each leg of the stand on which the hive is placed. The hive itself rests on pegs in the hollows, the pegs being thus surrounded by poison. This poison has retained its efficiency for over a year without renewal.

A serious outbreak of *Protostrophus perditor*, Mshl., occurred on maize in the Transvaal in the spring. The adults were present in numbers, and in many cases completely destroyed the plants, so that the fields had to be resown. Poison baits made from cut up green fodder and sodium arsenite were fairly efficient when applied to patches bared by the weevil. This bait and others containing lead arsenate or Paris green were less effective when placed between the rows of the

growing crop. Spraying was not satisfactory; but observations indicate that clean culture and bare fallowing are useful methods of control.

Considerable damage has been done to cotton in Zululand by *Syagrus rugifrons*, Baly, which has been for several years an occasional pest in South and East Africa. The beetles feed on the leaves, and the larvae gnaw the underground stem and roots of the plant. Some success has been obtained with a poison bait made of green fodder soaked in sweetened sodium arsenite. It is possible that a close season of 1 or 2 months, during which an absolutely bare fallow is maintained, would help to check this pest. It is, however, not expected to be serious every year.

Experiments that almost amount to a field test have been made on *Euxoa segetum* with a new cutworm bait [*R. A. E.*, A, xiii, 39]. Although the mortality was about the same both with sodium fluoride and sodium arsenite, the former is more effective in protecting the plants as it is more readily eaten and is preferred to the plants.

VAN DER MERWE (C. P.) & KENT (C. C.). **The Elegant Grasshopper** (*Zonocerus elegans*, **Thunb.**).—*Jl. Dept. Agric. Union S. Africa*, x, no. 1, pp. 29–42. Pretoria, January 1925.

The life-history, distribution and food-plants of *Zonocerus elegans*, Thunb., in South Africa are discussed, and recommendations are made for its control. The latter include spraying with a half per cent. solution of sodium arsenite in the case of weeds and plants of no value and with calcium arsenate (1 oz. to 3 gals. water) in the case of crops. The latter should be done when there is a prospect of fine weather for some days. In unsettled weather, if the expense is justified, lead arsenate, which is not so easily washed off, may be used at the rate of 2 oz. of paste or 1 of powder to 2 gals. of water. It is important that the adults be destroyed in some way (hand collection or mechanical means) before they lay their eggs. The best time for spraying is immediately after they hatch. The poisons have no repellent action on this species.

The natural enemies include a small dormouse (*Graphiurus* sp.) and *Sarcophaga* sp. The eggs are probably eaten by fowls and other scratching birds.

DUPONT (P. R.). **Insect Notes.**—*Ann. Rept. Seychelles Dept. Agric. 1923*, pp. 4–5. Victoria, 1924. [Received 19th January 1925.]

Most of the injurious Coccids in the Seychelles are now kept in check by the fungus, *Cephalosporium*, which is particulatly effective against *Coccus* (*Lecanium*) *viridis* in coffee, lime and orange plantations, *Eucalymnatus* (*L.*) *tessellatus* on cinnamon bushes, and *C.* (*L.*) *mangiferae* on clove trees. Coconut plantations are, however, still suffering from scale infestation. Several new species of beneficial fungi have been discovered and are awaiting identification; others have been introduced from abroad. The small black ant, *Technomyrmex*, is apparently diminishing, but the large species, *Odontomachus haematoda*, is spreading in coconut plantations, nesting near the roots, and is said to drive away other insects (termites, etc.) from the stems.

Tan (J. P.). **The Rice Root Aphis** (*Dryopeia hirsuta*, **A. C. Baker**).—*Philippine Agriculturist*, xiii, no. 7, pp. 276–288. Los Baños, December 1924.

A detailed account is given of the biology of *Dryopeia hirsuta*, Baker, occurring on the roots of rice, especially upland varieties, in the Laguna Province. It feeds on many weeds when rice is not available, but apparently shows a distinct preference for the latter. It is exclusively parthenogenetic; under laboratory conditions the total life-cycle varied from 13 to 18 days. As temperature falls and precipitation increases, the alate forms decrease in proportion to the apterous ones. No natural enemies were found, except an undetermined spider, which occasionally preyed upon the Aphids. This Aphid has never been reported as causing serious injury, and an increase in infestation is not necessarily followed by a decrease in yield of grain. It does not produce stunting of the plants, probably because it does not attack them until they are about a month old, when they can withstand the injury resulting from feeding. Should remedial measures be necessary, clean cultivation and the planting of resistant varieties should prove sufficient.

Ward (J. M.). **The Fruit-fly Pest. Victoria guards against Re-infestation.**—*Fruit World of Australasia*, xxv, no. 12, p. 565. Melbourne, December 1924.

In view of the possibility of the reappearance of the fruit-fly [*Ceratitis capitata*] in Victoria, growers are urged to place bait traps in the trees and to spray should the pest appear [*cf. R.A.E.*, A, xii, 411, 467]. The following spray is recommended: 2½ lb. sugar, 3 oz. lead arsenate paste, and 4 gals. of water, to be applied every 10 days and again immediately after rain.

Simmons (C.). **Winter Trapping of Fruit-fly.**—*Jl. Dept. Agric. W. Australia*, i, no. 4, pp. 472–473. Perth, December 1924.

In Western Australia the spraying against the fruit-fly [*Ceratitis capitata*, Wied.] was stopped on the 15th May and recommenced on 6th November, whilst from June to the end of October, pollard bait traps [*R.A.E.*, A, xii, 411] were hung in the trees. By this means a continuous organised campaign against this pest was ensured over an area of about 40 sq. miles from November 1923 to November 1924. The traps were hung on the north-east side of the trees. The details of the catches are tabulated, and leave no doubt as to the efficacy of this method. The greatest objection to trapping on a commercial scale is the time involved in collecting the traps, but a liquid extract from pollard bait with which experiments are being made by Mr. Newman would largely reduce this disadvantage.

Newman (L. J.). **Woolly Aphis Parasite** (*Aphelinus mali*).—*Jl. Dept. Agric. W. Australia*, i, no. 4, pp. 481–482. Perth, December 1924.

Details are given of the distribution in various localities of *Aphelinus mali*, Hald., introduced a little more than a year ago from New Zealand for the control of the woolly aphis [*Eriosoma lanigerum*, Hausm.]. There is every reason to believe that the parasite has become established in several districts, and that in time it will fulfil its object.

Newman (L. J.). **Codlin Moth** (*Carpocapsa pomonella*). **Warning.**—*Jl. Dept. Agric. W. Australia*, i, no. 4, p. 483. Perth, December 1924.

Cydia (*Carpocapsa*) *pomonella*, L., has not yet been recorded from Western Australia. The importance of this fact and the consequent need of complying with all regulations designed to keep out this pest are emphasized.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxii, pt. 6, pp. 413–416. Brisbane, December 1924.

Experiments have led to the conclusion that the grey-back cockchafer [*Lepidoderma albohirtum*] is most easily controlled in its larval or adult stage. Remedies that appear of outstanding merit are the collection of grubs by hand from behind the plough and from under rubbish in wet weather, soil fumigation, encouragement of root growth by means of manure and cultivation, and maintenance of the soil in a friable state and free from weeds. Paradichlorobenzene is considered the best soil fumigant, but calcium cyanide promises to be equally effective, and carbon bisulphide has also given good results. The various field and cultural operations that have been recommended from time to time are recapitulated.

Cottrell–Dormer (W.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxii, pt. 6, pp. 419–424. Brisbane, December 1924.

In the Isis district the cane grub, *Pseudoholophylla furfuracea*, is the most serious pest. It greatly resembles *Lepidiota frenchi*, but a careful study of its life-history and habits is required before remedies can be attempted, though one grower reports good results with carbon bisulphide. Injurious grubs not usually found in the far north caused great damage in some districts; such are *Lepidiota* sp. and *L. grata*, both of which have a two years' life-cycle, and both of which attack young plants as well as mature cane. The former greatly resembles *L. frenchi* and the latter *L. rothei*. While the adults of the former do not appear until November, the latter emerges with the early thunder showers in October. Whether the beetles must feed before oviposition is not yet known. As in normal seasons the damage occurs in small patches, carbon bisulphide treatment would probably give good results after pulling up a stool here and there to locate the centres of infestation. Local damage was also caused by *Pentodon australis* [*R.A.E.*, A, xiii, 19], the large moth borer [*Phragmatiphila truncata*], *Dasygnathus australis*, *Isodon puncticolle* and *Neso flavipennis*.

Jarvis (H.). **Fruit Fly Investigations.**—*Queensland Agric. Jl.*, xxii, pt. 6, 435–438. Brisbane, December 1924.

Experiments with the fruit-fly, *Dacus ferrugineus* (*Chaetodacus tryoni*), although not conclusive, indicate that the insect does not pass the winter months in the soil as a pupa in the Granite Belt, though according to H. Tryon it may, under certain circumstances, do so in the fruit of the native plant, *Noteloea longifolia*. This furnishes a breeding-ground for *Opius* [*tryoni*], the parasite of the fruit-fly, and should be encouraged to the fullest extent. It would also be advisable to establish other

plants bearing small fruits, especially non-esculent ones, in which not only the first appearing fruit-flies in each season might oviposit, but in which (owing to the smallness of the fruits) the resulting maggots might serve for the natural increase of the parasites. These will then be available to destroy the fruit-fly maggots later on when merchantable fruit is in the orchard.

The distribution of *Aphelinus mali*, the parasite of the woolly aphis [*Eriosoma lanigerum*], is being continued, and every effort will be made to establish a colony of it in every centre throughout the district. The black and green peach Aphids, *Anuraphis persicaeniger* and *Myzus persicae* have caused considerable losses to plum, peach and nectarine trees, much of the fruit dropping off the trees. Repeated spraying with nicotine sulphate, with soap as a spreader, is recommended, and para-dichlorobenzene is being tested as a soil fumigant for the former. The caterpillar of a small moth (probably a species of *Eublemma*) is a useful predator of the Coccid, *Lecanium berberidis*. A small moth larva has also been found in numbers preying on San José scale [*Aspidiotus perniciosus*], but the adult has not yet been reared. *Orthorrhinus cylindrirostris* damages apple wood by gnawing the bark of the smaller branches and sometimes attacks the surface of the fruit in a similar manner; in some districts the larva of this weevil bores in the wood of grape-vines. *Xyleborus solidus* has been found in plum, apricot and apple trees, but only attacks dying wood.

Lyon (A. V.). **Problems of the Viticultural Industry.**—*Commw. Australia Inst. Sci. & Ind.*, Bull. 28, 84 pp., 17 pls. Melbourne 1924. [Received 10th February 1925.]

This bulletin includes a list of the insect pests of grapes in Australia, with brief notes on their bionomics and control. Next in importance to *Phylloxera* is *Plodia interpunctella* (lesser dried fruit moth), of which there are usually two generations in the year. Infestation occurs on the drying ground, in the packing house, or in the packed fruit. The three methods of dealing with this pest are the prevention of infestation by removal of all material in which the larvae can live, the treatment of all fruit on the assumption that it may be infested, and special packing to guard against infestation. These methods are discussed in detail.

There are no other pests that necessitate regular treatment, though a few require attention in certain seasons and in particular vineyards. Among these *Tortrix* (*Cacoecia*) *postvittana* (light brown apple moth) occasionally causes serious injury to grapes, but may usually be controlled by an early and thorough spraying of the bunches with lead arsenate. *Agarista glycine* (vine moth) seldom causes sufficient damage to warrant control. *Hippotion* (*Chaerocampa*) *celerio* (silver-striped hawk moth), if causing damage to young vine shoots, may be destroyed by hand. *Orthorrhinus cylindrirostris* (elephant beetle) chiefly injures vines where they are in close proximity to tamarix trees or where they are losing vigour; it may be controlled by the elimination of these predisposing causes.

Other miscellaneous pests are *O. klugi* (vine curculio); the bugs, *Mictis profana*, *M. symbolica*, and *Rhyparochromus* sp.; cutworms, of which *Agrotis spina* is chiefly in evidence in irrigated areas; *Thrips tabaci*; *Eriophyes vitis*; and, infesting the dried grapes, *Ephestia kühniella*, *Tribolium castaneum* (*ferrugineum*) and *Silvanus surinamensis*.

French, Jr. (C.) & Pilloud (L.). **Control of Woolly Aphis.**—*Jl. Dept. Agric. Victoria*, xxii, pt. 12, pp. 725–727, 1 pl. Melbourne, December 1924.

Eriosoma lanigerum, Hausm. (woolly aphis) may be satisfactorily controlled by a spray made as follows :—1 lb. soap is boiled in 1 gal. water until dissolved, to this 1 gal. of red oil is added and, when thoroughly mixed, also 1 pt. nicotine sulphate. When the whole is well mixed 80 gals. water are added, and, if the water is hard, a small piece of washing soda. This spray is best applied in the winter when the trees are leafless, though no scorching was noticed on those sprayed when in blossom.

As soon as sufficient numbers are available, *Aphelinus mali*, imported from New Zealand, will be liberated for the control of *E. lanigerum* ; but, in view of the efficiency of the spray and its low cost (less than 1½d. per tree), orchardists are advised not to rely wholly on the parasite.

Snyder (T. E.). U.S. Bur. Ent. **Whence the Termites of Hawaii ?**—*Proc. Hawaiian Ent. Soc. 1923*, v, no. 3, pp. 381–384. Honolulu, December 1924.

The termites of Hawaii are *Neotermes connexus*, Snyder ; *Kalotermes immigrans*, Snyder ; *Cryptotermes piceatus*, Snyder ; and *Coptotermes intrudens*, Oshima. *N. connexus* is considered by many to be the only indigenous species, and the probable country of origin of the others is discussed.

Swezey (O. H.). **Notes on Insect Pests in Samoa.**—*Proc. Hawaiian Ent. Soc. 1923*, v, no. 3, pp. 385–393. Honolulu, December 1924.

This list of Samoan insect pests has already been noticed [*R.A.E.*, A, xii, 272].

Timberlake (P. H.). **Descriptions of New Chalcid-flies from Hawaii and Mexico (Hymenoptera).**—*Proc. Hawaiian Ent. Soc. 1923*, v, no. 3, pp. 395–417, 8 figs. Honolulu, December 1924.

The Encyrtids, *Acerophagus debilis*, sp. n., and *Synaspidia pretiosa*, gen. et sp. n., reared from *Pseudococcus brevipes*, Ckll. (*bromeliae*, auct.) are described from Mexico. The new species from Hawaii include *Aphelinus maidis*, reared from *Aphis maidis*, Fitch, and *A. sacchari*, Zehnt. ; *Aphelinus gossypii*, reared from *Aphis gossypii*, Glover, and probably also attacking *A. medicaginis*, Koch ; and *Aphelinoidea xenos*, reared from eggs of the Delphacid, *Sogata paludum*, Kirk. A key is given to certain species of *Aphelinus*, mostly Hawaiian and North American.

Timberlake (P. H.). **Records of the Introduced and Immigrant Chalcid-flies of the Hawaiian Islands (Hymenoptera).**—*Proc. Hawaiian Ent. Soc. 1923*, v, no. 3, pp. 418–449. Honolulu, December 1924.

Of the 144 species here recorded, at least 24 have been purposely introduced. Notes are given on the distribution of the species on the different islands, and the dates of their introduction or first capture.

TIMBERLAKE (P. H.). **Notes on Hawaiian Aphidae with a List of Food Plants (Homoptera).**—*Proc. Hawaiian Ent. Soc. 1923*, v, no. 3, pp. 450–460. Honolulu, December 1924.

In all 37 species of Aphids are recorded from Hawaii, with their food-plants. Some of them are undescribed species, but all have apparently been introduced. Many species of great economic importance elsewhere, however, only feed on weeds in Hawaii.

CAESAR (L.). **Spray Injury in Ontario in 1924.**—*Canad. Hortic.*, Fruit edn., xlviii, no. 1, p. 5. Peterboro, Ont., January 1925.

During the spring of 1924, in Ontario, considerable scorching occurred on apple trees after spraying with lime-sulphur. This occurred both when the spray was applied just as the buds were bursting and when the leaflets had appeared. This is considered to be due to the weakened condition of growth resulting from prolonged cold weather. Under such conditions a weaker spray (about 1 gal. to 40) should be used, or else Bordeaux mixture (3 lb. copper sulphate, 6–9 lb. hydrated lime and 40 gals. water). The latter will not control Coccids; the oyster-shell scale [*Lepidosaphes ulmi*, L.] may, however, be controlled by using lime-sulphur for the third application, that is immediately after the blossoms fall. Bordeaux mixture should not be used three times in succession, or applied heavily; under such conditions it will cause as much injury as lime-sulphur. Unless *L. ulmi* is very abundant, the first application, if lime-sulphur is used, should not be stronger than 1 gal. to 35 or 40 gals. water, and it should be applied when the leaflets have begun to appear. A tower should be used for all trees over 18 years of age. The man on the tower may use a spray gun, but the man on the ground should use a pole 7 or 8 feet long with two angle disc nozzles with moderate openings so that they will give a fine mist.

MARCOVITCH (S.). **New Insecticides for the Mexican Bean Beetle and other Insects.**—*Tennessee Agric. Expt. Sta.*, Bull 131, 19 pp., 7 figs. Knoxville, Tenn., October 1924. [Received 20th January 1925.]

Experiments have been conducted with numerous non-arsenical compounds in order to find a suitable substance for the control of *Epilachna corrupta*, Muls. (Mexican bean beetle). More than 40 different chemicals and combinations were tested, a list of the more important being given. Those that gave promising results were also tested under field conditions. The best results were obtained with sodium fluosilicate, which, even when used pure, caused very little injury to the foliage. The addition of lime does not reduce its killing efficiency. Calcium fluosilicate, although comparatively insoluble, causes injury to foliage, but this may be avoided by the addition of hydrated lime. Sodium fluosilicate is superior to arsenicals for various reasons: it is cheaper, it acts both as a stomach and contact poison, and it is less dangerous to man. Because of its irritating effect, the beetle attempts to clean its feet in its mouth, and enough of the chemical enters the mouth to cause death. Its weight is a distinct disadvantage, but it is probable that further research will solve the

factor of density, and that a lighter form of it may be obtained. It cannot be used as a spray on bean foliage, as in this form it is more or less injurious to the tender leaves. It is a by-product in the manufacture of acid phosphate, and is soluble to the extent of 1 part in 200 of water. For the control of *E. corrupta* it is recommended at the rate of 1 to 9 parts, by volume, of hydrated lime. From 15 to 25 lb. of the mixture are required per acre, according to the size of plants and the degree of infestation. It must be applied to the lower surface of the leaves. The first application should be made as soon as the beetles appear, and before egg-laying is in progress. The time of the second application depends largely on weather conditions; in the absence of rain the interval may be 10 days, but in the case of excessive rains it should not be longer than 4 or 5. As a rule 3 or 4 applications at intervals from 8 to 10 days are necessary, but for pole beans or other late varieties 5 or 6 applications may be required.

Sodium fluosilicate 1–9 was equally effective against *Leptinotarsa decemlineata* (potato beetle), *Epitrix cucumeris* (potato flea-beetle), *Ceratoma trifurcata* (bean leaf beetle), *Diabrotica vittata* (cucumber beetle), and *Protoparce quinquemaculata* (tobacco hornworm), but when undiluted with lime it caused some injury to plants, particularly tobacco. In all tests conducted with *Anthonomus grandis* (cotton boll weevil) the weevils were killed in from 5 to 24 hours. Cotton is a comparatively resistant plant, and is not injured, even when the substance is used undiluted.

Some of the gases used in the late war have proved satisfactory against insects in stored products, but caused marked injury to plants when used in the field. To obviate this injury the author considered the use of charcoal impregnated with absorbed gases, which would be liberated gradually. Mustard gas (dichlorethylsulphide), an oily liquid with a boiling point of 215–216°C., in amounts as small as ·01 per cent. on charcoal, with a little ether, killed the bean beetles in from 3 to 6 hours. As the beetle crawls over the plant impregnated with charcoal, it is irritated and cleans its feet, so that some of the gas enters the mouth as in the case of sodium fluosilicate. Nitrobenzene up to 2 per cent., with ·5 per cent. mustard gas without the ether, proved no more effective than ·01 per cent. mustard gas. Neither plant injury nor discomfort to the operator was caused by mustard gas in either of the concentrations used. Beetles placed on a plant that had been dusted with ·01 per cent. mustard gas 18 days previously died the next day, showing that the gases remain active in the charcoal for several weeks. With other insects this method gave varying results; in the case of *Protoparce quinquemaculata* small larvae were killed by ·01 per cent., but the larger ones were not affected. Field trials were not made with mustard gas, but good results were obtained with four weekly applications of charcoal mixed with about 5 per cent. liquid nitrobenzene.

In general the same results were obtained with absorbed gases against *Anthonomus grandis*, but less effective control was obtained. The ·01 percentage of mustard gas gave better results than the larger percentages, probably because it contained ether. Sixteen per cent. mustard gas by weight did not injure the cotton plants.

Other recommendations for the control of *Epilachna corrupta* are dusting with 1 part calcium arsenate and 9 parts of lime, or 1 part calcium arsenate, 1 part fine dusting sulphur and 4 parts hydrated lime. Where dusts cannot be used, a spray of magnesium arsenate at the

rate of 2 lb. to 100 U.S. gals. of water may be applied to the lower surface of the leaves, or 3 lb. hydrated lime, 1½ lb. calcium arsenate and 100 U.S. gals. water. The lime prevents scorching. Lead arsenate is not considered safe on bean foliage.

HENDERSON (W. W.). **A Taxonomic and Ecological Study of the Species of the Subfamily Oedipodinae (Orthoptera-Acrididae) found in Utah, with a Summary of World Distribution and a List of Orthoptera recorded for the State.**— *Utah Agric. Expt. Sta.*, Bull. 191, 150 pp., 6 pls. Logan, Utah, September 1924. [Received 9th January 1925.]

The contents of this paper are indicated by its title.

DOZIER (H. L.). **Insect Pests and Diseases of the Satsuma Orange.**— *Gulf Coast Citrus Exchange*, Educ. Bull. no. 1, 103 pp., 1 pl., 75 figs. Mobile, Ala., 15th August 1924. [Received 5th January 1925.]

The following list is given of the insect pests of the Satsuma orange in Alabama: the Coccids, *Lepidosaphes beckii*, Newm. (purple scale) (which is checked to some extent by fungous diseases, *Aspidiotiphagus citrinus*, How., and *Chilocorus bivulnerus*, Muls.), *L. gloveri*, Pack. (long scale), *Parlatoria pergandei*, Comst. (chaff scale), *Pseudaonidia duplex*, Ckll. (Japanese camphor scale), which is attacked by the same natural enemies as *L. beckii*, *Fiorinia theae*, Green (tea scale), *Chrysomphalus aonidum*, L., *C. dictyospermi*, Morg., *Coccus hesperidum*, L., *Saissetia oleae*, Bern. (black scale), *Ceroplastes floridensis*, Comst. (Florida wax scale), *Ceroplastes cirripediformis*, Comst. (barnacle scale), *Icerya purchasi*, Mask. (cottony cushion scale) (for which the best control is the Coccinellid, *Novius cardinalis*, Muls.), and the mealybugs, *Pseudococcus citri*, Risso (citrus mealybug) and *P. adonidum*, L. (long-tailed mealybug); the whiteflies, *Dialeurodes citri*, R. & H., and *Paraleurodes perseae*, Quaint.; *Frankliniella tritici*, Fitch (flower thrips); *Phyllocoptes oleivorus*, Ash. (rust mite); *Tetranychus* spp. (red spiders); *Diabrotica duodecimpunctata*, Oliv., and *D. balteata*, Lec.; and the bugs, *Nezara viridula*, L., and *Leptoglossus phyllopus*, L.

Minor pests included *Papilio cresphontes*, Cram. (orange dog); *Megalopyge opercularis*, S. & A.; *Phobetron pithecium*, S. & A. (hag moth); *Sibine stimulea*, Clem.; the leafhopper, *Oncometopia undata*, F.; the Fulgorids, *Ormenis pruinosa*, Say, and *O. septentrionalis*, Spin.; and certain wood-boring beetles, such as *Elaphidion inerme*, Newm., and *Liopus alpha*, Say, which, however, only attack unhealthy or dying trees.

Some account is given of the life-history and habits of these pests; and the preparation of suitable insecticides is described, with a spray schedule.

MYERS (P. R.). U.S. Bur. Ent. **The Identity of *Nemicromelus fulvipes* (Forbes), a Common Hessian Fly Parasite (Hymenoptera).**— *Proc. Ent. Soc. Wash.*, xxvi, no. 9, pp. 222–224. Washington, D.C., December 1924.

The common parasite of the Hessian fly [*Mayetiola destructor*, Say] was described in 1885 by Forbes as *Pteromalus fulvipes* and by Riley as

Merisus subapterus, a careful comparison of actual dates showing the former name to have priority. In view of the fact that *M. subapterus* has been cited as the genotype of *Nemicromelus*, Girault, the correct name for this parasite is *Nemicromelus fulvipes*.

GAHAN (A. B.). U.S. Bur. Ent. **The Systematic Position of the Genus *Harmolita* Motschulsky, with additional Notes (Hymenoptera).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 9, pp. 224–229, 1 fig. Washington, D.C., December 1924.

The author discusses the reasons for the use of *Harmolita* for the preoccupied genus *Isosoma* and suggests that the matter can only be satisfactorily settled by an examination of the genotypes.

Japan is possibly the country of origin of *Harmolita phyllostachitis*, Gah., which occurs on bamboo (*Phyllostachys bambusoides*) in Florida. It has recently been found in Japan, where a closely allied insect, *Ailomorphus rhopaloides*, Wlk., is also recorded as attacking the shoots of bamboo (*P. bambusoides* and *P. mitis*).

MORRISON (H.). U.S. Bur. Ent. **Synonymical Notes on Two Species of *Aulacaspis* (Hemiptera; Coccidae).**—*Proc. Ent. Soc. Wash.*, xxvi, no. 9, pp. 231–232. Washington, D.C., December 1924.

Diaspis (*Aulacaspis*) *flacourtiae*, Rutherford, is treated as a synonym of *D.* (*A.*) *major*, Ckll. This species has a wide distribution and numerous food-plants, and its close relationship with *D.* (*A.*) *pentagona*, Targ., suggests that it might develop into a pest of some importance if it became established in the subtropical regions of the United States.

As *D.* (*A.*) *major*, Rutherford, described from New Guinea on sugar cane [*R. A. E.*, A, v, 6], is a homonym of Cockerell's species, *D.* (*A.*) *rutherfordi*, n.n., is proposed for it.

HAMILTON (C. C.). **The Biology and Control of the Chrysanthemum Midge (*Diarthronomyia hypogaea*, F. Löw).**—*Maryland Agric. Expt. Sta.*, Bull. 269, 51 pp., 9 figs. College Park, Md., August 1924. [Received 10th January 1925.]

Diarthronomyia hypogaea, Lw. (chrysanthemum midge) was first noticed in Maryland in 1917. Much of the information has previously been noticed [*R. A. E.*, A, viii, 364]. Besides the two Chalcid parasites, *Amblymerus* sp. and *Tetrastichus* sp., another species, *T. diarthronomyiae*, Gahan, is found in the galls; this has a longer life-cycle than that of its host, the minimum in experimental work being 48 days. Examination of a number of greenhouses showed that parasitism by this species ranged as high as 54 per cent., with an average of 19 per cent. Predators include the Empid flies, *Platypalpus aequalis*, Lw., and *Tachydromia rostrata*, Lw., and ants.

Remedial measures are most successful against the egg stage of *D. hypogaea*. As this stage varies from 4 to 12 days, with an average of 5 or 6, an ovicide applied every fourth day should give complete control. The eggs are always laid on the growing tips of the plants in the cracks and crevices of the unfolding leaves and buds; therefore it is only necessary to wet thoroughly those parts of the plants. The best time to apply remedial measures is in the winter or very early spring, before the cuttings are taken from the stock plants. Under greenhouse

conditions, a successful spray may be either 40 per cent. nicotine sulphate or free nicotine used at a dilution of 1 : 500 parts of water. The effect of nicotine sulphate is slightly more lasting, and it is somewhat cheaper. One tablespoonful of calcium caseinate to each 2 U.S. gals., or 1 oz. of non-caustic soap, should be added as a spreader. Fair results were obtained with a proprietary extract of pyrethrum, diluted to 1 part in 500 parts water, with 1 oz. soap to each 2 U.S. gals., but this is not recommended as a substitute for nicotine. Better results are obtained if the tips of all new growth on the stock plants are cut off and spraying started 4 or 5 weeks before cuttings are taken for rooting ; if the cuttings are taken from the new growth after careful spraying, they should be free from infestation. All cuttings and young potted plants should be kept away from the greenhouse where the stock plants are grown, and the cuttings should be dipped in a solution of the spray material before putting them in the rooting beds (spraying is too strong for them). When in the rooting beds, the cuttings should be examined at least once a week and any developing galls removed. Plants moderately or severely infested should be removed and destroyed to prevent reinfestation. All plant remains from infested beds should be burnt.

YOTHERS (W. W.) & WINSTON (J. R.). **Mixing Emulsified Mineral Lubricating Oils with Deep-well Waters and Lime-sulphur Solutions.**—*U.S. Dept. Agric.*, Bull. 1217, 5 pp. Washington, D.C., 3rd December 1924.

More than half the citrus groves in Florida are in artesian well districts, and a large proportion of the finer grade fruit is grown in groves that are wholly dependent on water from deep wells for spraying purposes. This water contains compounds of calcium, magnesium, sulphur and other minerals in such proportions that ordinary unstabilised oil emulsions will not mix properly with it. The addition of soap has been suggested, but is very expensive. A less expensive method, which has given excellent results, is a combination of caustic soda and fish-oil soap, used at the rate of 8 oz. and from 1 to 2 lb. respectively to each 50 U.S. gals. of water. This is sufficient for any deep well water of Florida so far tested. The caustic soda is dissolved in a small quantity of water and then added to the water to be used for spraying, the soap is then dissolved and added. The emulsion is added after the mixture has stood about a minute. This method was even satisfactory in slightly brackish water.

In combination sprays of soda-sulphur and lubricating oils as used against rust mites, whiteflies and scale-insects, the soda-sulphur may be substituted for the caustic soda, but to make the spray miscible with deep well water the fish-oil soap must be added. Lime-sulphur is more effective than soda- or potash-sulphur, but will not mix with oil emulsion unless the latter has been stabilised with one of the different colloidal substances, such as glue [*R.A.E.*, A, vi, 449], skimmed milk powder, wheat flour, cornstarch, laundry starch or casein. To render oil emulsions miscible, so that they will mix with either deep well waters or diluted lime-sulphur solutions, 1 lb. of any of these stabilisers should be added to every 3 U.S. gals. of emulsion except in the case of casein of which only 8 oz. are required. A portion of one stabiliser may be used with a portion of another provided the required quantity of the combined materials is used. The various methods of using these materials are discussed, the most practical being to add

them to the emulsion just before it is poured into the spray tank containing the lime-sulphur solution or deep well water. The materials that do not require heat are simply dissolved in cold or hot water and added to the emulsion. Materials requiring heat, such as glue, may be added to the oil, water and soap when these are to be heated to make the emulsion, or they may be made into a paste and added to the emulsion. If the emulsion is to be kept for more than 3 or 4 days in the summer or for a somewhat longer period in the winter, ¾ to 1 per cent. of pure carbolic acid or cresol should be added to prevent fermentation. Commercial crude carbolic acid containing 50 per cent. of phenols may be used at the rate of 1½ to 2 qts. in 50 gals.

The formula recommended for the boiled oil emulsion is 2 U.S. gals. paraffin oil or lubricating oil, 1 U.S. gal. water, 2 lb. caustic-potash fish-oil soap and 1 lb. glue or other stabiliser. These quantities are for use with about 200 U.S. gals. of water or diluted lime-sulphur solution.

Essig (E. O.). **Economic Notes.**—*Pan-Pacific Ent.*, i, no. 2, pp. 93–94. San Francisco, Cal., October 1924. [Received 13th January 1925.]

Galerucella xanthomelaena, Schr. (elm-leaf beetle) is recorded for the first time from California. Many elm trees have been defoliated three times. Pupae of the second brood were found in large numbers in the cracks of the bark and on the ground about the base of the trees, there being every indication of a third brood being completed before the winter. Owing to the long dry summers and mild winters this beetle is likely to prove a serious pest of elm trees in cities.

The Pyralid, *Herculia phoezalis*, Dyar (cypress moth) has been found in destructive numbers on Monterey cypress [*Cupressus macrocarpa*] in California, the twigs being the part attacked.

According to W. W. Mackie, dry copper carbonate dust applied to seed wheat at the rate of 2 oz. per bushel kills all weevils and other insects and prevents reinfestation.

Brisley (H. R.). **The Mesquite Cutworm, *Melipotis indomita*, Walker.** —*Pan-Pacific Ent.*, i, no. 2, p. 94. San Francisco, Cal., October 1924. [Received 13th January 1925.]

Melipotis indomita, Wlk. (mesquite cutworm) is recorded as unusually abundant in Arizona, the mesquite (*Prosopis glandulosa*) being apparently its only food-plant. The larvae climb the limbs and feed on the leaves at night from the time the first buds appear in spring. About June they enter the ground for pupation, and this stage lasts about 15 days. Two Dipterous parasites have been reared, but they are by no means numerous.

Quarantine Inspector's Summary : Quarter ending September 30, 1924. —*Qtrly. Bull. State Pl. Bd. Florida*, ix, no. 1, pp. 53–54. Gainesville, Fla., October 1924.

The Mediterranean fruit-fly [*Ceratitis capitata*, Wied.] was intercepted in oranges on a ship arriving from Spain *via* Havana.

CHITTENDEN (F. H.). U.S. Bur. Ent. **The Acalypha Flea-beetle (*Crepidodera atriventris*, Melsh.).**—*Canad. Ent.*, lvi, no. 12, p. 286. Orillia, Ont., December 1924.

The flea-beetle, *Crepidodera atriventris*, Melsh., is a common pest of three-seeded mercury (*Acalypha virginica*), the adults puncturing the leaves with numerous more or less rounded holes almost as soon as the plant appears above-ground, while the larvae feed on the roots, being almost full-grown in June in Washington, D.C. The beetles have recently been found damaging useful plants, such as cultivated acalypha (*A. wilkesiana*), in May and June. They have also been recorded as occurring on sugar-beet in early October (though not positively stated to feed on this plant), presumably in Illinois, and on buckwheat. In Illinois the beetle hibernates in the adult stage.

GILLETTE (C. P.) & others. **Fifteenth Annual Report of the State Entomologist of Colorado for the Year 1923.**—*Office State Ent. Colorado*, Circ. 43, 71 pp., 9 figs. Fort Collins, Colo., June 1924. [Received 19th January 1925.]

Epilachna corrupta, Muls. (Mexican bean beetle) has recently become established in sections where snap beans are grown for canning, and owing to climatic conditions it will probably become a pest of major importance in the near future. *Eriophyes pyri*, Pgst. (blister mite), though not a serious pest of pear in Colorado, is reported from all sections as injurious to apple, on which it may be controlled by lime-sulphur sprays. *Tortrix* (*Archips*) *argyrospila*, Wlk. (fruit-tree leaf-roller), though suddenly decreasing in certain counties, has become more abundant in others, necessitating remedial measures. *Lepidosaphes ulmi*, L. (oyster-shell scale) is proving one of the most serious pests of shade trees, being particularly injurious to ash; it is also abundant on lilac, willow and poplar, but does not attack apple trees. *Chorizagrotis auxiliaris*, Grote, is the commonest cutworm, and it was responsible for heavy losses in some of the lettuce-growing sections. *Porosagrotis orthogonia*, Morr. (pale western cutworm) caused considerable injury to winter wheat and sugar beet; *Lycophotia margaritosa*, Haw. (*Peridroma saucia*, Hb.) (variegated cutworm) was abundant in lucerne fields and also injured tomatos, lettuce and celery; and unidentified climbing cutworms caused serious injury in peach orchards, but their numbers were reduced by the application of poisoned bran mash. *Pulvinaria vitis*, L. (cottony maple scale) is particularly injurious in Colorado Springs, where many maples are greatly damaged. *Gossyparia spuria*, Mod. (European elm scale) is proving injurious to all species of elm. Active campaigns have greatly reduced the numbers of *Aspidiotus perniciosus*, Comst. (San José scale) as compared with previous years. The Nematode, *Tylenchus dipsaci*, is apparently established in lucerne in Colorado, but its exact distribution and the damage done by it has not yet been determined. A bee, *Lithurgus apicalis*, Cress., is recorded as boring in telephone poles, from which the parasitic Bombyliid fly, *Spogostylum oedipus*, F., also emerged.

The work in connection with *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.) (alfalfa weevil) is reported on by J. H. Newton, the season of 1923 being very similar to the previous one [*R.A.E.*, A, xii, 237]. J. L. Hoerner records 13 species of false wireworms, of which some species of *Eleodes* were more or less abundant locally. Paris

green is apparently more effective in baits against these beetles than sodium arsenite, the formula being 4 lb. Paris green, 3 oz. amyl acetate, 100 lb. bran, and water to make a stiff mash.

A number of materials have been tested by G. M. List and J. L. Hoerner in order to find a suitable ovicide for preventing injury by larvae of codling moth [*Cydia pomonella*, L.]. Miscible oils and oil emulsions (except kerosene) gave the most promising results, the most practical formula being 1 per cent. red engine oil emulsion, prepared by the boiled process, using 1 U.S. gal. red engine oil, 1–2 U.S. gals. water, and 1 lb. potash fish-oil soap. The value of traps for *C. pomonella* is discussed by J. H. Newton and W. P. Yetter, Jr. Vinegar in varying strengths or fermented fruit was placed in jars in different parts of the tree. Those in the upper third of the trees catch most moths, the females being attracted in larger numbers than the males. Of the vinegar solutions a 10 per cent. mixture is probably the best, but fermented apple juice proved more attractive still. Banding the trees against this pest is more successful where they have first been scraped. *C. pomonella* has been found in certain localities infesting sweet cherries, not necessarily grown in close proximity to its other food-plants.

A general account of the food-plants, habits and life-history of grasshoppers is given by C. L. Corkins. The five most common species in Colorado are *Melanoplus bivittatus*, Say, *M. differentialis*, Uhl., *M. femur-rubrum*, DeG., *M. atlantis*, Riley, and *Dissosteira longipennis*, Thom. Conditions during the year under review proved similar to those in the previous year, the same bait being recommended [*R.A.E.*, A, xii, 237].

Fulton (B. B.). **Some Habits of Earwigs.**— *Ann. Ent. Soc. Amer.*, xvii, no. 4, pp. 357–367, 1 fig. Columbus, Ohio, December 1924.

An account is given of the care of the eggs and young by the female *Forficula auricularia*, L. The use of the forceps and the pairing habits are also discussed, the former in connection with various species of earwigs.

Trimble (F. M.). **Life History and Habits of two Pacific Coast Bark Beetles.**— *Ann. Ent. Soc. Amer.*, xvii, no. 4, pp. 382–391, 8 figs. Columbus, Ohio, December 1924.

The range of *Ips plastographus*, Lec. (engraver beetle) is not limited to the distribution of Monterey pine (*Pinus radiata*), which is unique in its sea-coast habitat; it has also been recorded from lodgepole pine (*P. murrayana*) in the Sierras. It will probably not become a serious pest of healthy trees, as it prefers those injured by other insects, fungus diseases or other causes. Healthy trees cut for commercial use are soon attacked and form excellent breeding-places. The construction of the adult and larval galleries is described. Though the combined length of mine seldom exceeds 40 mm., the beetles are often so numerous that the larvae destroy all the cambium of the trunk and larger limbs in a very short time. Small branches are avoided by the adults, probably because the moisture content would be insufficient for the larval development. The larvae avoid all dry cambium in making their mines. The total number of eggs laid by one female varies according to the season, but an average of 60 has been observed. They hatch in about 4 days, according to the temperature. Ten days later, the larvae begin constructing the pupal chamber; the pupae are

fully developed by the early part of the fourth week and usually transform into adults by the end of the fifth week. Late developing broods may lie dormant in the larval, pupal or adult stages until the following spring. The largest summer brood appears in August and September.

The natural enemies include fungus diseases, a Tyroglyphid mite, and the predacious beetles, *Clerus sphegeus*, F., *C. nigroventris*, Lec., and *Trogosita virescens*, F.

Infestation may be frequently reduced by cutting all infested trees for wood, this being used immediately and the slashings burnt. Dense stands should be thinned to give the trees every chance of withstanding the various predisposing causes to attack.

Ips radiatae, Hopk., is frequently confused with *I. concinnus*, Mann., but whereas the latter attacks sitka spruce (*Picea sitchensis*) from northern California to Alaska, *I. radiatae* only attacks Monterey pine and lodgepole pine. This species when occurring with *I. plastographus* may easily be distinguished by the peculiar shape of the parent galleries, which with the larval mines forms a fan-shaped engraving in the sapwood as compared with an inverted Y. The life-history is similar to that of *I. plastographus*, except that the larvae require almost double the time for their development. Pupation occurs about the eighth week, the adults emerging about the ninth.

The remedial measures and natural enemies are similar for both species. A pink *Penicillium* fungus was found only on *I. radiatae*.

LANGSTON (J. M.). **New *Phyllophaga* from Mississippi. (Coleoptera, Scarabaeidae).**— *Ann. Ent. Soc. Amer.*, xvii, no. 4, pp. 449–452, 1 pl. Columbus, Ohio, December 1924.

The species described are *Lachnosterna* (*Phyllophaga*) *taxodii* sp. n., on deciduous cypress (*Taxodium* sp.) and *L. micans*, Knoch, var. *copuliformis*, n., on live oak [*Quercus virginiana*] and pecan.

DYAR (H. G.). **A New Noctuid from Louisiana (Lepidoptera, Noctuidae).** —*Insec. Inscit. Menst.*, xii, no. 1–3, pp. 21–22. Washington, D.C., January–March 1924.

Meropleon cosmion, gen. et sp.n., is described from Louisiana, where it was found in grass (*Erianthus saccharoides*). Field observations indicate that the larvae enter the soil for pupation. Experimentally the larvae have been fed on sections of maize and sugar-cane stalks, exhibiting a preference for the latter.

BYNUM (E. K.) & HOLLOWAY (T. E.). U.S. Bur. Ent. **The New Pink Borer of Sugar Cane and Corn (Lepidoptera Noctuidae).**— *Ann. Ent. Soc. Amer.*, xvii, no. 4, pp. 469–472, 1 fig. Columbus, Ohio, December 1924.

Meropleon cosmion, Dyar (pink borer of sugar-cane) has been found in sugar-cane in Mississippi. The differences between the larvae of this species and those of *Diatraea saccharalis*, F., are discussed. According to field observations extending over a period of two years there is only one generation a year, and as the larvae are apparently inactive much of the time, it is not likely to become a serious pest. The adults emerge during the late autumn and apparently hibernate. The eggs are laid in the spring on sugar-cane, maize or heavy grass

plants. They soon hatch, the larvae reaching their maximum size in the summer. Pupation no doubt occurs in October. Pupal skins have been found in the tunnels in sugar-cane stalks. Though this moth was at first thought to be an introduced species, it seems more likely that it is indigenous on grasses and has adapted itself to sugar-cane and maize.

Newcomer (E. J.) & Whitcomb (W. D.). **Life History of the Codling Moth in the Yakima Valley of Washington.**—*U.S. Dept. Agric.*, Bull. 1235, 76 pp., 3 pls., 35 figs. Washington, D.C., 28th November 1924. [Received 26th January 1925.]

Cydia (*Carpocapsa*) *pomonella*, L. (codling moth) is the most serious pest of apples in Washington. There are two, practically complete, generations a year, with a small third one in some seasons. The extensive data on its seasonal history here recorded are the result of observations made during 1919–1921 in the Yakima Valley and 1915–1916 at Wenatchee. The larval parasites, *Aenoplex plesiotypus*, Cushm., and *Epiurus indagator*, Walsh, occur at Wenatchee, and the egg parasite, *Trichogramma minutum*, Riley, in the Yakima Valley.

McAtee (W. L.). **Local Suppression of Agricultural Pests by Birds.**—*Smithsonian Rept. 1920*, pp. 411–438, 3 pls. (Pubn. 2637) Washington, D.C., 1922. [Received 26th January 1925.]

This information is compiled from authentic records in which birds have been known to effect a material reduction in insect infestation in the United States. A list is given of the insects mentioned, with the birds destroying them.

Directions for Spraying Fruits in Illinois.—*Trans. Illinois State Hortic. Soc. 1923*, lvii, pp. 39–63, 2 figs. Urbana, Ill., January 1924. [Received 26th January 1925.]

In these instructions for spraying, the information is arranged under the crops to be sprayed, a special chapter being devoted to the making and mixing of standard sprays.

Flint (W. P.). **New or Unusual Insect Pests.**—*Trans. Illinois State Hortic. Soc. 1923*, lvii, pp. 474–475. Urbana, Ill., January 1924. [Received 26th January 1925.]

A brief outline is given of the life-history of the oriental peach moth [*Cydia molesta*, Busck], which has become established along the Atlantic Coast; and it is urged that if its occurrence should be recorded in Illinois it should be reported at once, so that remedial measures may be adopted without delay.

Howard (L. O.). **Report [1923–24] of the Entomologist.**—*U.S. Dept. Agric.*, 30 pp. Washington, D.C., 1924. [Received 21st January 1925.]

Much of the information in this report, which forms a review of the entomological situation in 1923–24, has been noticed from other sources. Experiments in refrigerating the soil balls about the roots of conifers for the destruction of the larvae of the Japanese beetle [*Popillia*

japonica] showed that in general when the plants were subjected to low temperatures the grubs were destroyed, but in the case of most plants treated the margin of safety for the plant was so small that the method proves of doubtful practical use. The larvae can stand temperatures approaching zero provided that the change is not too sudden. In the case of evergreen stock up to 6 or 7 feet in height, the soil could all be removed from the roots and replaced by uninfested soil. By this means it is thought that some evergreen stock may be utilised that would otherwise be a dead loss. Proper treatment with carbon bisulphide of the soil about the roots of rhododendrons, blueberries, azaleas, etc., which grow in heavy mixtures of peat and sand, kills about 100 per cent. of the larvae, no other organic compound tried being equally effective. Studies of the adult beetles showed that certain essential oils, of which geraniol proved the best, when sprayed on the foliage or made into a bait by mixing with bran, were very attractive as food. In recent investigations with insecticides [*R.A.E.*, A, xii, 175] a process was devised of coating the particles of lead arsenate with an insoluble soap, such as lead oleate. It was found that a mixture of lead arsenate paste with 2 per cent. of lead oleate on the basis of dry weight was best for spreading and sticking on the foliage, and that the beetles fed readily on foliage sprayed with this mixture. For the destruction of the grubs in the soil, in cold-frames or nursery beds, 1,500 lb. of acid lead arsenate per acre is used, and methods are being studied for treating it to protect it from the action of the soil and soil organisms so that it will remain in the acid condition. It is thought that this method may have a much wider application, such as for the treatment of grubs in golf greens. In connection with parasite introduction [*R.A.E.*, A, xii, 172] several hundred adults of the Dexiid, *Prosena siberata*, were released in 1923, but none have yet been recovered. Philadelphia is now under quarantine for *Popillia japonica*, and as it is one of the largest nursery and greenhouse districts in the United States special attention is being given to the danger of spreading the beetle over long distances from this source. The method of carrying out the farm-products quarantine has been changed from inspection at the point of origin to the zone system, the zone in the case of Philadelphia being fixed at a radius of approximately 25 miles. Scouting for the beetle has shown that 2,500 square miles are now infested.

Against grape leaf-hoppers [*Erythroneura*], converging sprays have been found the most effective, and boom attachments to the spray apparatus are much more satisfactory than trailer or hand-nozzle spraying. Few eggs hatch on leaves that have been thoroughly coated on the lower surface with sprays containing 40 per cent. nicotine sulphate at a strength of 1 : 2,000; apparently these should be applied somewhat earlier than hitherto advised. Nicotine dusts seem to compare favourably with liquid applications, particularly if the dusting machine is followed by a spring-toothed harrow, which buries many nymphs that have fallen from the effects of the dust.

Investigations are being made regarding the hickory twig-girdler [*Oncideres cingulata*] in view of its serious depredations in the Carolinas and Virginia. The indications are that the pecan weevil [*Balaninus caryae*] can be killed by arsenicals when on the trees during August and September, while the larvae in the nuts will succumb to proper doses of carbon bisulphide. Studies on the biology of the plum curculio [*Conotrachelus nenuphar*] have shown that only one generation of this

insect occurred in Georgia in 1923, though there were two in each of the two preceding years. Probably the late spring of 1923 delayed the beetles from leaving hibernation quarters and prolonged the pupal stage in the soil. The practice of picking up infested fruit is of far more value than is generally recognised, especially in years of great abundance. The use of oil emulsion against San José scale [*Aspidiotus perniciosus*] has shown a great saving over the use of lime-sulphur, etc. In Washington, laboratory tests indicate that 3 per cent. emulsion is satisfactory in killing the eggs of the European red mite [*Tetranychus telarius*] and other mites, while in Georgia a 2 per cent. emulsion was successful against *A. perniciosus* on peach trees.

The work of the year in connection with the brown-tail moth [*Nygmia phaeorrhoea*] and the gipsy moth [*Porthetria dispar*] is reviewed. The former continues to increase in the sea-coast towns in New Hampshire and south-west Maine, but otherwise infestations are local and the damage comparatively slight. The area infested by gipsy moth in New Jersey has been reduced by 50 sq. miles during the year and is now half its original size. Sprays on conifers and other trees have frequently failed to give satisfaction because they did not remain on the trees. Recent experiments have shown that the addition of 1 quart oil to each 100 gals. of lead arsenate spray ensures adherence, linseed oil giving the best results.

The alfalfa-seed Chalcid [*Bruchophagus funebris*] seriously interfered with the growing of Peruvian lucerne in Arizona, and funds have been assigned for the investigation of this problem. The sorghum midge [*Contarinia sorghicola*] continues to limit the production of *Sorghum* for seed in the interior of Texas. A cultural method of control is promising and is being worked out.

In the course of stored product investigations the discovery that cured meats can be safely fumigated with hydrocyanic acid gas has led to a change in the Federal inspection regulations permitting the use of this gas in meat establishments. *Piophila casei* (cheese skipper) is an important pest of cured meat, of which an amount valued at about £200,000 is condemned annually on account of damage by insects. During hot weather the female, which lives only 5 to 8 days, may lay as many as 500 eggs, and the insect may pass through two generations in a month. A study of *Necrobia rufipes* (ham beetle) has shown that adults may live more than 14 months and may deposit as many as 2,100 eggs, the life-cycle from egg to adult being completed in as few as 30 days. The infestation of wheat by *Sitotroga cerealella* (Angoumois grain moth) has proved to be much greater when the crop is mature in the field than had formerly been supposed, thus emphasising the importance of prompt harvesting and threshing.

Studies on citrus thrips [*Scirtothrips citri*] in California have revealed that the insect does not pass the winter in rubbish under trees as was thought, but in the egg stage in the tenderest growth of the previous autumn. A new winter food-plant has been discovered in the pepper tree [*Schinus molle*], but *Citrus* is the chief food-plant throughout the active season, there being no marked exodus to other plants. No native food-plants have been found. The disinfection of bulbs as a remedy for the larger bulb fly [*Merodon equestris*] is proving difficult; the larvae seem to be very resistant to vacuum fumigation with carbon bisulphide at the rate of 4 and 10 lb. per 1,000 cu. ft. of space. Fumigation with hydrocyanic acid gas against the cattleya fly [*Furcaspis biformis*] in greenhouses has not proved successful; nicotine dust and

other insecticides are being tried. In the substitution of calcium cyanide for sodium cyanide against Aphids in greenhouses, it was found that overnight fumigation at the rate of ¼ oz. per 1,000 cu. ft. of space gave complete control of three species of Aphids, though ½ oz. resulted in severe scorching of the plants, probably owing to high humidity at the time.

The hope that the Mexican bean beetle [*Epilachna corrupta*] would not thrive under the humid conditions and low altitudes of the coastal plain areas has proved to be unfounded, and the insect has been more injurious to beans than in any other season. The attempt to establish the Tachinid parasite, *Paradexodes epilachnae* [*R. A. E.*, A, xii, 167] has apparently failed, but further efforts are to be made in this direction. The seed corn maggot [*Phorbia cilicrura*] was a serious pest of seed potatoes in North Carolina in 1923. Preliminary tests indicate that mercury bichloride used as a dip for seed potatoes has a definitely repellent effect. Wireworms in cultivated land can apparently be kept in check by a combination of trap baits followed by the application of a soil fumigant; from 5 to 7 per cent. of the injury to tobacco plants has been prevented by the trap bait method at a cost of less than 1 per cent. of the value of the crop. It has now been definitely proved that *Cerotoma trifurcata* (bean leaf-beetle) is a definite transmitter of cowpea mosaic.

The use of calcium arsenate against the cotton boll weevil [*Anthonomus grandis*] is now becoming so general as to make the results more or less a matter of local and seasonal conditions. Particular attention was given to a study of the increase in infestation by Aphids that sometimes accompanies the use of the poison; it seems as though this can usually be avoided by proper modification of the poisoning schedule without interfering with the successful control of the weevil. The use of aeroplanes for dusting is being developed, and at least five distinct types of dusting equipment have been devised to meet the requirements of the different flying characteristics of the aeroplanes employed.

The sugar-cane moth borer [*Diatraea saccharalis*] has proved more injurious to rice than the rice stalk-borer [*Chilo plejadellus*]. The newly hatched larvae of both species can be destroyed with calcium arsenate. Grazing was found beneficial on cut rice fields, the trampling of the animals destroying the borers hibernating in the rice stubble.

The situation with regard to forestry pests is reviewed, and statistics are given regarding the result of many forest projects. It is now thought possible to determine the dates of recent or past outbreaks of defoliating insects from the effect produced on the growth of the annual rings of the tree. There was an epidemic of the southern pine beetle [*Dendroctonus frontalis*] from Virginia southward to eastern Texas, the losses being particularly heavy in Virginia and parts of Mississippi.

17th Annual Report of the Commissioner of Agriculture of the State of Texas for the Fiscal Year beginning September 1, 1923, and ending August 21, 1924.—pp. 11–21. Austin, Tex., 1st November 1924.

Conditions regarding insect infestations were much the same as in the previous year [*R. A. E.*, A, xii, 157]. The oil emulsion spray used against whitefly [*Dialeurodes citri*, Ashm.] proved very successful, and is now widely used against this pest on Cape jasmine [*Gardenia jas-*

minoides] before the buds are cut and shipped. Consistent dusting and spraying has considerably reduced both scale and thrips infestation in the citrus orchards.

McDonald (R. E.). **Report of the Entomologist.**—*17th Ann. Rept. Commiss. Agric. Texas, Sept. 1923–August 1924*, pp. 30–35. Austin, Tex., 1st November 1924.

The pink bollworm [*Platyedra gossypiella*, Saund.] is now well established in certain fields in Texas, and inter-county quarantine regulations have been promulgated, the text of which is given. The eradication work in eastern and northern Texas has been gratifying.

There have been no notable outbreaks of crop pests during the year, but considerable damage to cotton has been done by the cotton flea [*Ballus seriatus*, Reut.]; the very small squares of attacked cotton turn black and drop off and the stalk grows tall with little or no fruit. A small Capsid bug was also present and may be partly responsible for the damage. The condition is not thought to be due to the insects themselves, but possibly to a disease transmitted by these or other insects.

Post (G. B.). **Boll Weevil Control by Airplane.**—*Georgia State Coll. Agric.*, xiii, no. 4, Bull. 301, 22 pp., 8 figs. Athens, Ga., November 1924. [Received 2nd February 1925.]

Dusting by aeroplane has been shown to be the most effective and efficient method yet adopted for the control of the boll weevil [*Anthonomus grandis*, Boh.] [*cf. R. A. E.*, A, xii, 164], and when properly operated has proved to be thoroughly practical and economical for commercial use. It affords a saving of 50–60 per cent. in the amount of calcium arsenate required to produce the same results by any other means of delivery. It can be carried out in winds of 12 miles an hour velocity, and without the necessity of having the plants wet with dew. Unlike ground machines, aeroplanes are not prevented from working by the muddy conditions following heavy rain, when treatment is of the utmost importance in order not to lose the benefit of previous applications. When properly designed for the work, an aeroplane can dust from 200–1,000 acres an hour, depending on the size of the fields to be treated, whereas the best cart machines average only 30 acres a day. This rapidity of application is particularly valuable when heavy infestations of weevils or other insects are unexpectedly discovered. Demonstrations on a large scale were carried out in 1924 in Georgia. It is pointed out that for the greater efficiency of such work a central supply base covering a whole district on a contract basis should be organised.

The Blueberry Leaf-beetle and some of its Relatives. Fall (H. C.). **Part i. Systematic,** pp. 81–91. Woods (W. C.). **Part ii. Economic and Biological,** pp. 92–140.—*Maine Agric. Expt. Sta.*, Bull. 319, 15 figs. Orono, Me., October 1924. [Received 31st January 1925.]

In the first part of this paper a key is given to the New England species of *Galerucella*, with descriptions of the new species *G. kalmiae*, common on laurel, *G. vaccinii*, on *Vaccinium*, *G. spiraeae*, on *Spiraea*, *G. alni*, on alder, and *G. perplexa*, on willow.

In part ii, an account is given of the five species of *Galerucella* of economic importance in Maine, with notes on the other 10 species dealt with and their food-plants. *G. vaccinii* (blueberry leaf-beetle) hibernates in the adult stage in the débris at the base of *Vaccinium* bushes (blueberry), and appears in the field about mid-May. Eggs are laid chiefly in June and July, this stage lasting from 2 to 4 weeks. The larvae feed exclusively on the lower surface of the leaves, leaving a network of fine veins and the upper epidermis, which turns brown. The larval stage lasts about 20 days, after which the larva enters the soil and constructs a pupal cell a little way below the surface, the pupal stage lasting about 8 days. Adults of the next generation appear in July and feed in the same manner as the larvae. As the oviposition period lasts more than 2 months, all stages of the insect may be found simultaneously. A description of each stage is given. The insect apparently confines itself to *Vaccinium*, subgenus *Cyanococcus* (true blueberries). No insect enemies of the leaf-beetle have been found, but it is very susceptible to attacks of the fungus, *Sporotrichum globuliferum*, which, when conditions are favourable for it, destroys many of the insects. Except for *Rhagoletis pomonella*, Walsh, and *Haltica* (*Altica*) *cuprescens*, Blatchley, *G. vaccinii* is the most serious insect enemy of Maine blueberries, and may, in 2 or 3 successive seasons of abundance, kill off blueberry bushes over quite large areas. On the barrens, in common with other leaf-feeding insects, it is held in check by the periodic burning over of the plains. In other parts of the State blueberries grow mostly on uncultivated land where control measures are not feasible. Where practicable, lead arsenate (1½ lb. powder or 3 lb. paste in 50 U.S. gals. water) applied in May and July is recommended, or, better, a dust of 1 part lead arsenate to 7 or 8 parts of some inert substance such as finely powdered gypsum or flour.

G. decora, Say (grey willow leaf-beetle) has only one generation in a year; the adults appear from hibernation quarters and feed from early June to mid-July; those of the next generation appear about 20th August. The feeding habits and injury are very similar to those of *G. vaccinii*. Tests showed that all species of *Salix* and *Populus* were readily eaten, while all other food was refused. The insect is of considerable importance in such regions as central New York, where basket-making from willows is an important industry, but in Maine the willow is not of great consequence; the insect is, however, a potential menace to poplars. The remedies are the same as for *G. vaccinii*.

G. perplexa (brown willow leaf-beetle), although apparently intermediate between *G. decora* and *G. alni*, is confined to willow and poplar and is unable to subsist on alder.

G. cavicollis, Lec. (cherry leaf-beetle) is the most injurious of the native species of *Galerucella*, but is not dealt with at length, as much has previously been written about it [*R. A. E.*, A, iv, 309, 341; vii, 182]. The preferred food is undoubtedly *Prunus pennsylvanica* (wild red cherry), though *P. serotina* (wild black cherry) is also attacked.

G. xanthomelaena, Schr. (elm leaf-beetle), which is very destructive in southern New England, has gained a foothold in south-western Maine and is a potential menace to elms throughout the State. Its life-history in Maine is not known, but in Connecticut there are probably two generations a year, the adults of the second generation hibernating. The preferred food in Maine is *Ulmus americana* (white elm), though *U. fulva* (red elm) may also be attacked.

Dean (G. A.). **Some Insect Enemies of House Plants and of the Flower Garden.**—*Bienn. Rept. Kansas State Hortic. Soc., 1922–23,* xxxvii, pp. 178–191. Topeka, Kans., 1924. [Received 5th February 1925.]

The chief species in Kansas are the Coccids, *Pseudococcus citri,* Risso, *P. adonidum,* L. (*longispinus,* Targ.), *Coccus hesperidum,* L., *Saissetia hemisphaerica,* Targ., *S. oleae,* Bern., *Aspidiotus hederae,* Vall., and *Chrysomphalus aonidum,* L.; the Aphids, *Myzus persicae,* Sulz. *Macrosiphum rosae,* L., *M. sanborni,* Gill. (black aphis of chrysanthemum), *Illinoia* (*M.*) *pisi,* Kalt., *Micromyzus violae,* Rug. (black violet aphis), *Aphis gossypii,* Glov., and *Myzus circumflexum,* Buckt. (lily aphis); the greenhouse whitefly *Trialeurodes* (*Aleurodes*) *vaporariorum,* Westw.; *Lygus pratensis,* L. (tarnished plant bug); and *Tetranychus telarius,* L. (red spider). General recommendations against these pests in greenhouses and flower gardens are included, with instructions for fumigation with hydrocyanic acid gas.

Hunter (S. J.). **An Ounce of Prevention, iii.**—*Bienn. Rept. Kansas State Hortic. Soc., 1922–23,* xxxvii, pp. 191–195. Topeka, Kans., 1924. [Received 5th February 1925.]

An account is given of the natural work of parasitic and predacious enemies in limiting the numbers of insect pests; parasitism in general is discussed, and some of the better known importations of parasites and predators are quoted.

McColloch (J. W.). **The Resistance of Plants to Insect Injury.**—*Bienn. Rept. Kansas State Hortic. Soc., 1922–23,* xxxvii, pp. 196–208. Topeka, Kans., 1924. [Received 5th February 1925.]

This is largely a compilation from other work. The resistance of plants to insect injury offers a large field of research, which has not been much explored by entomologists, but the progress that has been made offers encouragement to other workers. This paper is a preliminary consideration of the subject, its possibilities and its many intricate problems. Both natural and artificial or induced resistance are discussed, as well as the general and specific causes of resistance. A bibliography of nineteen works is appended.

Hunter (S. J.). **Some Insects of the Year.**—*Bienn. Rept. Kansas State Hortic. Soc., 1922–23,* xxxvii, pp. 209–210. Topeka, Kans., 1924. [Received 5th February 1925.]

A brief account is given of a few of the commoner pests observed in Kansas in 1922–23, which are recorded under their popular names only.

Compere (H.). **New Chalcidoid (Hymenopterous) Parasites and Hyperparasites of the Black Scale,** *Saissetia oleae* **Bernard.**—*Univ. Cal. Pubns. Ent.,* iii, no. 3, pp. 295–328, 7 pls. Berkeley, Cal., 14th January 1925.

The importance of the parasites of *Aphycus lounsburyi,* How., introduced into California for the control of *Saissetia oleae,* Bern., in 1919, is discussed [*R. A. E.,* A, xii, 81].

Eusemion californicum, sp. n., and *Cheiloneurus inimicus*, sp. n., are parasites of *A. lounsburyi*, as is also *C. lineascapus*, Gah., but *C. noxius*, sp. n., has not actually been reared from it though it has been taken in association with *S. oleae*.

Coccophagus anthracinus, sp. n., and *C. trifasciatus*, sp. n., are primary parasites of *S. oleae*. Brief life-history notes are given of the species described.

Holloway (T. E.) & Haley (W. E.). U.S. Bur. Ent. **Sugar Cane Insects in Louisiana in 1924. Investigational Work and Control Progress—Increase of Interest among Planters.**—*Facts about Sugar*, pp. 82–85. New York, 24th January 1925; also in *Planter & Sugar Mftrer.*, lxxiv, no. 4. New Orleans, La., 24th January 1925.

The conditions with regard to insect pests of sugar-cane in Louisiana during 1924 are reviewed, most of the information given having been noticed previously [*R. A. E.*, A, xii, 318, 585; xiii, 126].

Report of the Division of Entomology, Fiscal Year 1923-1924.—*Ann. Rept. Insular Expt. Sta., Rio Piedras, Porto Rico, 1923-24*, pp. 88–103. S. Juan, P.R., 30th July 1924. [Received 10th January 1925.]

Following upon the previous year's experiments in the control of white grubs [*Lachnosterna*] in Porto Rico [*R. A. E.*, A, xii, 394] tests were made with calcium cyanamide as a soil dressing, but this did not prove to be highly toxic to them, even when used in such large amounts as to stop the germination of maize. An emulsion of carbon bisulphide and fish-oil soap has been tried against these grubs. It was not found possible, with the water in San Juan, to make an emulsion with rain water or distilled water, either alone or together, but by adding the right amount of sodium carbonate, a perfect emulsion was made. Too much sodium carbonate caused precipitation of the carbon bisulphide. When 6 cc. of the diluted emulsion was used to a square foot of soil, from 90 to 100 per cent. of the grubs were killed, provided that the treatment was given on moist ground; a heavier dosage gave no greater mortality.

The susceptibility of different varieties of sugar-cane to the moth stalk-borer, *Diatraea saccharalis*, F., is discussed; the parasite, *Lixophaga* (*Euzenilliopsis*) *diatraeae*, Towns., which has recently been introduced from Cuba into British Guiana [*R. A. E.*, A, xiii, 86] in the hope of controlling this pest, is found to occur apparently as commonly and to be as beneficial in Porto Rico as in Cuba.

The ant, *Myrmelachista ambigua ramulorum*, Wheeler, is considered by many growers to be the chief pest of coffee. It nests in great numbers in old guama [*Inga laurina*] and guaba [*I. vera*] trees in coffee groves, whence it infests coffee to such an extent that the trees readily break; it also protects the Coccids, *Pseudococcus citri*, Risso, and *Cryptostigma inquilina*, Newst., which are serious coffee pests. If these shade trees were cut down and replaced by other kinds, the ant would be eliminated for several years. If this is not practicable, the best remedy is to apply, in dry weather, a poison bait consisting of ½ lb. ground meat with 1 oz. sodium or potassium cyanide; this should be applied to an infested tree where the bark is rough, on little shelves beneath the places where ants are abundant. The ants that come to feed

cannot then fall off until they have felt the full effects of the poison ; they die within a few minutes, and as many as 2,400 have been found dead on one such shelf. As the poison only operates for a certain time, it should be applied immediately after mixing, and not more than the quantity recommended should be mixed at once for each tree. Careful and persistent applications of this poison kill large numbers of the ants. The wireworms, *Aeolus elegans*, F., and *Monocrepidius bifoveatus*, P. de B., were very injurious in tobacco plantations ; potato baits are apparently fairly successful if placed in the beds before tobacco is planted.

There is only a small central portion of the island in which cotton is not now infested with pink bollworm, *Platyedra* (*Pectinophora*) *gossypiella*, Saund., and the probability is that within a short time (perhaps a year) the infestation will become general. Records of the numbers of *Cosmopolites sordidus*, Germ. (banana borer) taken in traps of banana stems and corms show clearly that persistent collection will keep down the weevils to a minimum, but it must be continuously practised and form a permanent part of plantation work. The resistance of various kinds of woods (of which the popular names only are given) to attacks of the termite, *Cryptotermes brevis*, Wlk., is discussed.

In the autumn of 1923 there was an outbreak of *Remigia* (*Mocis*) *punctularis*, Hb. (*repanda*, auct.) (grass looper caterpillar), both pastures and fields of young sugar-cane being attacked, but apparently the second generation following the outbreak was controlled by natural enemies. *Blissus leucopterus*, Say (chinch bug) was also noticed for the first time as a pest in Porto Rico, where it attacked perfectly healthy sugar-cane ; lack of rainfall and the comparative scarcity of the common grass lizard, *Anolis pulchellus*, were probably the causes of its abundance. Caterpillars, probably of a species of *Acrolophus*, were found injuring the roots of pasture grasses, but soon disappeared. Experiments in the transmission of mosaic disease proved negative with any Aphids other than *Aphis maidis*, Fitch. The only grass in which successful inoculations of the disease were made by *A. maidis* was *Echinocloa colono*. Seed from diseased plants of this grass were, however, healthy.

Work connected with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Vincent 1922*, pp. 20–26. Trinidad, 1923. [Received 13th January 1925.]

The work in connection with the control of *Dysdercus delauneyi* includes destruction of its food-plants and of the insect itself, the latter both during the close season for cotton and afterwards. Infestations were discovered in a sugar-cane field and an arrowroot field, both of which had been manured with cotton seed.

Experiments to ascertain the effect on cotton-stainers of feeding them on different plants [*R. A. E.*, A, xi, 162] have been continued. The effect of different kinds and qualities of cotton seed meal is also discussed. No attempt is made by the insects to reach cotton seed meal when it is covered with soil, though only to a depth of half an inch, and cotton seed may be buried 6 inches beneath the soil without any fear of plants appearing above the surface. In trap experiments it was found that the insects attracted to cotton seed meal placed in holes in the ground and then covered with soil were all killed, and they

died more quickly when buried in wet soil than in dry. In all cases they died within 96 hours of being covered.

Other pests recorded both of cotton and other crops are the same as in the previous year [*loc. cit.*].

Molinary Sales (E.). **Extirpación del gusano agrimensor** (*Mocis* (*Remigia*) *repanda*) **que ataca las hojas de la caña.** [Eradication of *Remigia punctularis* attacking the Leaves of Sugar-Cane.]—*Rev. Agric. Puerto Rico*, xiii, no. 6, pp. 385–388, 1 fig. S. Juan, P.R., 1924.

In a case of infestation of sugar-cane by *Remigia punctularis*, Hb. (*Mocis repanda*, auct.) in Porto Rico, dusting with a mixture of 1 part lead arsenate and 3 of slaked lime destroyed the larvae. A bird, *Holoquiscalus brachypterus*, is an effective enemy of the larvae.

McCallan (E. A.). **Report of the Director of Agriculture for the Year 1923.**—*Bermuda : Repts. Bd. & Dept. Agric. 1923*, pp. 7–27. London, 1924. [Received 5th February 1925.]

Satisfactory results were obtained against *Diaspis* (*Aulacaspis*) *pentagona* (oleander scale) at the end of 1922 with applications of soluble sulphur compound. It appears that *Aphelinus diaspidis* is becoming better established in Bermuda than are the other natural enemies imported from Italy. The finding of this scale on aralias from the West Indies indicates that it was imported on plants from there into Bermuda. Local outbreaks of *Comstockiella sabalis* (palmetto scale) have been recorded.

Edwall (G.). **O scolyto do grão de café,** *Stephanoderes coffeae* **Hag. Segundo as monographias de Morstatt e Vayssière.** [The Coffee Berry Scolytid, *S. hampei* Ferr. According to the Monographs of Morstatt and Vayssière.]—*Bol. Agric.*, xxv, nos. 6–7, pp. 257–269 & 293–302. S. Paulo, June-July 1924. [Received 13th January 1925.]

The title indicates the nature of this account of the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.).

de Toledo Piza Junior (S.). **Primeiras notas sobre um scolytidio da roseira.** [First Notes on a Scolytid of the Rose.]—*Bol. Agric.*, xxv, no. 7, pp. 320–327. S. Paulo, July 1924. [Received 13th January 1925.]

The discovery of a Scolytid infesting the rose in S. Paulo is recorded [*R. A. E.*, A, xiii, 88].

de Azevedo (A.). **A** *Phthorimaea operculella* **Zell., na Bahia.** [*P. operculella* in Bahia.]—*Correio-Agric.*, ii, no. 11, p. 330. Bahia, November 1924.

With reference to the discovery in May 1924 of *Phthorimaea operculella*, Zell., on tobacco in the Brazilian State of Bahia [*R. A. E.*, A, xiii, 21] it is stated that this pest had been previously bred in Brazil in 1923 from larvae mining tobacco leaves. Picard's view that this moth is a native of South America seems correct.

DE AZEVEDO (A.). **A *Braula coeca*, piolho das abelhas.** [*B. coeca*, the Bee Louse.]—*Correio-Agric.*, ii, no. 11, pp. 333–334. Bahia, November 1924.

The bee louse, *Braula coeca*, has been observed in hives in Bahia during the rainy season. If the queen is attacked, the colony is weakened and may perish. Small pieces of naphthaline placed in the hive will protect it; they must be renewed from time to time.

DE AZEVEDO (A.). **Insectos observados, em plantas deste estado, pelo Serviço de Vigilancia Vegetal.** [Insects observed on Plants in the State of Bahia by the Plant Inspection Service.]—*Correio-Agric.*, ii, no. 11, pp. 331–332. Bahia, November 1924.

The insects found on cultivated plants in Bahia include: On beans and peas, *Bruchus pisorum*, L.; on orange, *Aleurothrixus floccosus*, Mask., *Lepidosaphes pinnaeformis*, Bch., *Pinnaspis aspidistrae*, Sign., *Chrysomphalus aonidum*, L., *Coccus viridis*, Green, and *C. hesperidum* L.; on aepim (*Manihot palmata*), *Eudiplosis brasiliensis*, Rbs.; on palms, *C. aonidum*, and *Eucalymnatus perforatus*, Newst.; on coconut, *Rhynchophorus palmarum*, L.; on crotons, *Saissetia hemisphaerica*, Targ., and *Orthezia insignis*, Dougl.; on cotton, *Platyedra gossypiella*, Saund., *Dysdercus ruficollis*, L., and *Oxycarenus hyalinipennis*, Costa; on oleanders, *Pseudaonidia trilobitiformis*, Green, and *Aphis nerii*, Boy.; on mango, *Vinsonia stellifera*, Westw.; on *Eugenia pitanga*, *Syntomaspis myrtacearum*, C. Lima, *Eurytoma* sp., and *Prodecatoma* sp.; and in coffee berries, *Araecerus fasciculatus*, DeG., and *Cathartus advena*, Walt.

OGILVIE (L.). **Preliminary Report of the Plant Pathologist for the Period September 27th to December 31st, 1923.**—*Bermuda: Repts. Bd. & Dept. Agric. 1923*, pp. 28–34. London, 1924. [Received 5th February 1925.]

Severe bronzing of the upper surface of the leaves of avocado is caused in Bermuda by *Paratetranychus* sp.; both this mite and *Empoasca minuenda* may be controlled by routine spraying with weak lime-sulphur. *Cosmopolites sordidus* is only of importance where bananas are unhealthy. *Asterolecanium bambusae* occurs on the stems and *A. miliaris* on the twigs and leaves of bamboo, but neither is of serious importance. *Empoasca fabae* (*mali*) caused considerable injury to the leaves of the autumn crop of beans. *Zinckenia fascialis* (Hawaiian beet webworm), which severely damages early crops of beet, may be controlled by dusting with lead arsenate. *Tetranychus telarius* caused extensive injury to the leaves of cassava [*Manihot utilissima*].

The most important pest of *Citrus* is *Lepidosaphes beckii*, against which lubricating oil emulsions are recommended. *Araecerus fasciculatus* and *Calandra oryzae* are destructive to stored maize; exposure to a temperature of 125°–135° F. for several hours will kill all grain pests, and such exposures for not more than 6 hours do not injure the germination of the grain. *Pseudococcus adonidum* (*longispinus*) is recorded from eddoes (*Colocasia antiquorum*). The most serious pests of loquats [*Eriobotrya japonica*] in certain localities is a small brown caterpillar, which attacks the flowers and developing fruit. Spraying

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with ½ oz. lead arsenate powder to 1 gal. water has been recommended ; the addition of ½ lb. sugar per gal. will assist in preventing fruit-fly injury.

The Chalcid parasite, *Aphelinus diaspidis*, has been bred from *Diaspis* (*Aulacaspis*) *pentagona* (oleander scale) from widely separated areas. *Morganella longispina* (black scale), which occasionally occurs on papaya stems, may be got rid of with lime sulphur. Most of the so-called rust or tip-burn of potatoes was found to be due to *Empoasca fabae* ; *Myzus persicae* and the flea-beetle, *Epitrix parvula*, were prevalent on the autumn crop. *Pseudococcus citri* is found on stored potatoes and also on geraniums. *Comstockiella sabalis* occurs on the native palmetto (*Sabal blackburnianum*) ; another palm, *Livistona chinensis*, is severely attacked by *Cerataphis lataniae*. *Chrysomphalus aonidum*, *C. dictyospermi* and *Diaspis boisduvalii* have been found on small unidentified palms. The Curculionid, *Diaprepes* (*Exophthalmus*) *esuriens*, was destructive to rose leaves in one locality. *Pseudococcus nipae* was commonly found on sugar apples (*Annona squamosa*), but is easily controlled by spraying with lime-sulphur, 1–40. *Paratetranychus tumidus* on sweet potatoes was checked by dusting with sulphur. The flea-beetles, *Epitrix parvula* and *Chaetocnema apricaria*, were common in certain fields of this crop.

Aspidiotus destructor was intercepted on cycads from the West Indies ; it has not yet been found in Bermuda ; *Diaspis pentagona* was found on a pot plant similarly imported.

Sobrero (L. R.). **La isoca o taladro del maíz.** [The Maize Borer.]— *Gaceta rural*, xviii, no. 209, pp. 439–441, 3 figs. Buenos Aires, December 1924.

The European maize borer [*Pyrausta nubilalis*] occurs in various parts of the maize-growing regions of Argentina. This pest cannot be stamped out until agriculturists co-operate with the authorities in the adoption of radical measures.

Vayssière (P.). **Le problème acridien (Septembre-Novembre 1924).**— *Matériaux pour l'étude des calamités*, no. 3, pp. 274–282, 1 map. Geneva, October-December 1924.

The locust conditions throughout the world during the period of September to November 1924 are briefly reviewed, one of the outstanding features being the abundance of *Schistocerca paranensis* in Argentina. A map is given showing the course followed by the invading swarms. The author intends publishing in the above journal a quarterly summary of locust conditions.

Trinchieri (G.). **Quel che costano all' economia mondiale le cause avverse alla produzione agricola.** [The Cost to the World's Wealth of Factors unfavourable to agricultural Production.]— *Il Pensiero*, i, no. 1, pp. 7–9. Rome, 15th January 1925.

The title indicates the contents of this article, which mentions instances of damage by insects that have resulted in enormous losses.

CLEVELAND (L. R.). **Les effets de l'inanition et de l'oxygénation sur la symbiose entre les termites et leurs flagellés intestinaux.**—*Ann. Paras. hum. & comp.*, iii, no. 1, pp. 35–36. Paris, January 1925.

A more detailed account of these observations has already been noticed [*R. A. E.*, A, xii, 339]. In the present paper a table is given showing the results of various methods used for the sterilisation of protozoa in *Termopsis nevadensis*, Hagen.

THERON (J. J.) & CUTLER (J. V.). **A Contribution to our Knowledge of the Function of Nicotine in the Tobacco Plant.**—*S. Afr. Jl. Sci.*, xxi, pp. 189–194. Johannesburg, 1924.

The alkaloids in the plant system have been described as excretory or waste products that may function incidentally as protective agents against the depredations of animals and diseases; but in spite of the poisonous character of nicotine to the animal organism, it fails to protect the tobacco plant from attacks of Nematodes, Aphids, etc. Some significant changes in the nicotine content of these plants (*Nicotiana rustica*) have been noticed at different stages of growth.

The authors' summary of these observations is as follows. That nicotine functions in the tobacco plant as a storage product seems to be upheld by the following facts: The total nicotine produced per acre and the percentage of nicotine per plant increases up to the flowering stage, after which there is a rapid decline of nicotine in favour of other nitrogenous products. The formation of seed has the immediate effect of reducing the percentage of nicotine per plant. If seed formation is prevented, the nicotine tends to increase rather than decrease. Even after the plant is harvested and the supply of essential salts are thus cut off, it continues to grow for some time, and concomitant with this there is a marked decline in the nicotine content. In order to effect an increase both in the yield of this alkaloid per acre and the percentage of nicotine per plant, the crop must necessarily be manured with phosphatic and potassic as well as with nitrogenous fertilisers. The importance to the grower of this conception of the function of nicotine in the plant is pointed out.

KALSHOVEN (L. G. E.). **Schade door hout-boeboek, speciaal in verband met de Theecultuur.** [Injury by Wood Borers, especially in Tea Cultivation.]—*Handelingen van het Theecongres* (*Bandoeng, 1924*), pp. 58–72. Batavia, 1924. (With an English Summary.)

The ambrosia beetles usually infest diseased or recently felled trunks, though healthy trees may be attacked. The genus *Xyleborus*, to which the shot-hole borer of tea, *X. fornicatus*, belongs, is the genus of most importance to tea planters. Other boring beetles include the Bostrychids, the adults of which bore into the sap-wood for oviposition, the larvae then mining the sap-wood and branches, and Lyctids and Anobiids which oviposit on the surface of seasoned timber (such as tea chests) into which the larvae burrow.

KALSHOVEN (L.). **Boschinsecten en de indische culturen.** [Forest Insects and Dutch East Indian cultivated Plants.]—*De Indische Culturen*, 1924, separate, 2 pp.

More attention should be devoted to the forest insects found in the Dutch East Indies, since many forest trees are related to cultivated ones and many forest insects have a variety of food-plants.

UCHIDA (T.). **Some Japanese Ichneumonidae, the Hosts of which are known.**—*Jl. Sapporo Soc. Agric. & Forestry*, xvi, no. 69, pp. 195–256. Sapporo, December 1924. [In Japanese.]

Among the species recorded, together with their hosts, are: *Dinotomus mactator*, Tosq., *D. xuthi*, Kriech., and *D. lapidator*, F., parasitic on *Papilio* spp.; *Hadrojoppa cognatoria*, Sm., on *Herse* (*Protoparce*) *convolvuli*, L.; *Hoplismenus aquilinus*, sp.n., on *Parnara mathias*, F.; *Ichneumon melitorius*, Grav., on *Agrotis* (*Rhyacia*) *brunneus*, F.; *I. generosus*, Sm., on *Papilio xuthus*, L.; *Melanichneumon leucaniae*, sp. n., on *Cirphis* (*Leucania*) *unipuncta*, How.; *M. spectabilis*, Holmg., on *Acronycta intermedia*, Seitz; *Amblyteles oratorius*, F., on *Dendrolimus* spp.; *Amblyteles vadatorius*, Illg., on *Euxoa segetum*, Schiff.; *Eurylabus yponomeutae*, Mats., on *Hyponomeuta* (*Yponomeuta*) *malinellus*, Z.; and *Aethecerus parianae*, sp. n., on *Hemerophila* (*Simaethis*) *pariana*, Clerck. The descriptions of the new species are in German.

HORI (H.). *Comibaena obsoletaria*, **Leach** (**Geometridae**).—*Insect World*, xxix, no. 1, pp. 4–7, 1 pl. Gifu, January 1925. [In Japanese.]

The larvae of *Comibaena obsoletaria*, Leach, feed on *Ligularia tussilagineana* and *Quercus glauca*. Pupation takes place about the 10th May, the pupal period lasting about two weeks. The adult, larva, and egg are described.

KISHIDA (K.). **A new Aphid injurious to the Pear in Japan.**—*Dobotsugaku Zasshi* [*Zool. Mag.*], xxxvi, no. 433, pp. 472–474. Tokyo, November 1924. [In Japanese.]

The wingless form of a new Phylloxerine, *Cinacium iaksuiense*, gen. et sp. n., is recorded as injurious to the pear in the Nara prefecture, and a very brief description is given of it.

AIZAWA (T.). **Studies on** *Dendrolimus sibiricus*, **Tshtvr.** (**Lasiocampidae**) **in the Kurile Islands, Japan.**—*Hokkaido Forest Expt. Sta.*, no. 10, pp. 101–147, 8 pls. Hokkaido, November 1924. [In Japanese.]

During recent years an enormous increase of *Dendrolimus sibiricus* took place in Saghalin, in some localities in Hokkaido and on some of the Kurile Islands, and quite serious damage was done to *Picea jezoensis*, *Abies* spp., *Larix leptolepis* and other conifers. The adult moths appear in July and August. One female may produce from 150 to 300 eggs, about 220 being the average. They hatch in two weeks. The larvae cease to feed in October or November and hibernate

among fallen leaves, mosses, etc., on the ground. They begin feeding again in April or May, when they are voracious and can travel considerable distances. Pupation occurs from the end of June to the end of August, the pupal stage lasting three weeks to a month. Some individuals hibernate a second time in the larval condition. Eight species of Ichneumonids, a Braconid and four Chalcids are parasitic on the larvae or pupae, some of them being very common; and the fungus, *Botrytis bassiana*, is the most important of the diseases to which they are subject.

TAKAHASHI (R.). **Some Aphididae from China.**—*Trans. Nat. Hist. Soc. Formosa*, xiv, no. 73, pp. 55–56. September 1924. [In Japanese.]

At present 23 species of Aphids are known to occur in China. The following are recorded for the first time from this country, most of them having been collected in Nanking: *Macrosiphum nishigaharae*, Essig & Kuw., on *Chrysanthemum* sp.; *Rhopalosiphum nymphaeae*, L., on peach (*Prunus persica*); *Aphis medicaginis*, Koch, on *Dolichos lablab*; *Anuraphis pyri*, Mats., on *Pyrus* sp.; *Hyalopterus arundinis*, F. (*pruni*, F.), on *Prunus americanus*; *Periphyllus koelreuteriae*, Tak., on *Koelreuteria paniculata*; and *Pterochlorus tropicalis*, v.d.G., on *Quercus serrata*.

[VINOKUROV (G. M.).] **Винокуров (Г. М.). Кобылки и борьба с ними.** [Grasshoppers and their Control.]—**Иркутская Станция Защиты Растений от Вредителей** [*Irkutsk Sta. Plant Prot. Pests*], 8 pp. Irkutsk, 1924. [Received 13th February 1925.]

This is a popular bulletin on grasshoppers, the recommendations for control being poisoned baits consisting of 40 lb. sawdust or dry horse dung, 1½ lb. sodium arsenate or Paris green, and 3 gals. hot water.

[KAZANSKI (A. N.).] **Казанский (А. Н.). Краткий отчет о деятельности Иваново-Вознесенской Станции Защиты Растений от Вредителей за летний период 1924 года.** [A Short Report on the Activities of the Ivanov-Voznesenski Station for the Protection of Plants from Pests during the Summer Period of 1924.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 78–82. Leningrad, December 1924.

The correlation of insect pests, climatic conditions and pollinating agents appear to be responsible for the failure of clover harvests in Russia. In these investigations it was found that bumble bees responsible for the pollination of the clover carry a large number of spores of *Botrytis anthophila* in the pollen on their legs, and must thus be considered disseminators of this disease of clover.

In connection with the study of *Apanteles glomeratus*, L., a parasite of the cabbage butterfly, *Pieris brassicae*, L., the results do not agree with those obtained in western Europe, where the parasite is considered to attack various hosts, as it was found to be apparently confined to Pierine butterflies. During the period under review parasitism was as high as 100 per cent. in some cases.

Trachea (*Hadena*) *secalis*, L., was of local occurrence on rye; *Chlorops taeniopus*, Meig., was particularly abundant on wheat and barley; peas were injured by *Sitona lineata*, L.; the sawfly, *Athalia colibri*, Christ (*spinarum*, F.), was less abundant on crucifers than was expected. *Hyponomeuta malinellus*, Z., was prominent among the usual orchard pests. Forest pests included bark-beetles, *Panolis flammea*, Schiff. (*piniperda*, Panz.) and *Diprion pini*, L.

[Troitzki (N. N.).] **Троицкий (Н. Н.). К методике учета повреждений яровых хлебных злаков.** [On the Method of Estimating Injury to Cereals.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 105–110, 1 fig. Leningrad, December 1924.

Instructions are given for the observation and recording of injury to cereals in the field, with a key for the identification of insect pests by the appearance of the injury, and the eggs, larvae and pupae of the species concerned are briefly described.

[Mordvilko (A. K.).] **Мордвилко (А. К.). Тли культурных растений окрестностей Ленинграда.** [Aphids of Cultivated Plants in the Environs of Leningrad.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 111–116. Leningrad, December 1924.

The Aphids attacking graminaceous plants are *Aphis* (*Sitobion*) *avenae*, F., on rye, barley and wheat, but chiefly on wild Graminaceae; *Illinoia* (*Metopolophium*) *dirhodum*, Wlk., migrants of which are sometimes found on oats, barley, etc., the primary food-plant being *Rosa*, on which two generations occur; *Aphis* (*Siphonaphis*) *padi*, L., on barley, oats, etc., the primary food-plant being *Prunus padus*, while in the autumn at least the sexuparae occur on the lower surface of apple leaves; *Anoecia corni*, F., migrants of which occur on the roots of wheat, etc., the primary food-plant being *Cornus sanguinea*; and *Tetraneura ulmifoliae*, Baker (*ulmi*, DeG.), migrants of which sometimes occur on the roots of barley and oats, the primary food-plants being *Ulmus campestris* and *U. montana*.

The Aphids attacking vegetable crops in the same locality are *Brevicoryne brassicae*, L. (cabbage aphis); *B. anthrisci*, Kalt., on *Anthriscus*, *Aegopodium podagraria*, etc.; *Aphis rumicis*, L. (*papaveris*, F.), on *Atriplex*, beet, poppy, etc., the primary food-plants being *Euonymus europaeus* (the author considers further investigations necessary before Börner's division of *Aphis rumicis*, L. [*R. A. E.*, A, x, 505] is accepted); *Amphorophora* (*Megoura*) *viciae*, Kalt., on *Vicia* spp. and *Lathyrus* spp.; *Illinoia* (*Acyrthosiphon*) *pisi*, Kalt., occurring only on papilionaceous plants; *Cavariella pastinacae*, L., migrating from *Salix* spp. to various umbelliferous plants; *Myzus* (*Myzoides*) *persicae*, Sulz., on beet, cabbage and cucumber; *Myzus* (*Aulacorthum*) *pelargonii*, Kalt., on potatoes; and *Pemphigus lactucarius*, Pass., migrating from *Populus* to lettuce (*Lactuca sativa*) and *Sonchus*.

The Aphids attacking fruit trees and bushes are *Aphis pomi*, DeG., on apple; *A. grossulariae*, Kalt., on gooseberry, black currant, etc.; *Myzus cerasi*, L., on cherry; *Aphis idaei*, v.d.G., on *Rubus* spp.; *Capitophorus ribis*, L., on red currant; *Rhopalosiphum lactucae*, Kalt., on black currant in the spring, later on *Sonchus* and *Lactuca*; *Amphorophora rubi*, Kalt., on *Rubus* spp.; and *Eriosoma ulmi*, L., migrating from *Ulmus campestris* to black currant.

[Orlova (A. I.).] **Орлова (А. И.). Наблюдения над партеногенезом** *Hemiteles areator* **Panz.** [Observations on Parthenogenesis in *H. areator*.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3-5, pp. 116–124, 6 figs. Leningrad, December 1924.

The anatomy and habits of *Hemiteles areator*, Panz., are described. It is a parasite of *Apanteles glomeratus*, L., but is indiscriminate in its choice of host in the laboratory. No change in the food either as regards quantity or quality affected the sex, no males being recorded, and reproduction being always parthenogenetic during 26 generations.

[Reikhardt (A. N.).] **Рейхардт (А. Н.). Определительная таблица русских смолевок** (*Pissodes* **Germ.**). [Key for the Determination of the Russian Species of *Pissodes*, Germ.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 127–129, 17 figs. Leningrad, December 1924.

The contents of this paper on the species of *Pissodes* in European and Asiatic Russia are indicated by its title.

[Rodionov (Z. S.).] **Родионов (З. С.). Вредители огородничества в Азербейджане.** [Vegetable Pests in Azerbaijan.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 129–131. Leningrad, December 1924.

The pests recorded include the following: *Tetranychus telarius*, L., causing serious injury to cucumbers and melons, followed by fungous diseases which completely destroy the crop; *Gryllotalpa unispina*, Sauss., and *G. gryllotalpa*, L. (*vulgaris*, L.), which are abundant in vegetable gardens and may be controlled by extensive irrigation followed by hand collection; *Tettigonia* (*Decticus*) *verrucivora*, L., *T.* (*D.*) *albifrons*, L., *T.* (*Locusta*) *viridissima*, L., and *Metrioptera* (*Platycleis*) *affinis*, Fieb., causing considerable injury to cucurbits, etc., during summer drought; *Dociostaurus maroccanus*, Thunb.; *Calliptamus italicus*, L.; *Thisoecetrus dorsatus*, Fisch.; *Aphis gossypii*, Glov., on melons, cucumbers and cotton; *Brevicoryne* (*Aphis*) *brassicae*, L., on cabbage; *Pieris brassicae*, L., causing considerable injury to various crucifers; *Epicauta erythrocephala*, Pall., attacking melons, cucumbers and potatoes; *Colaphus hoefti*, Mén., on cabbage and other cultivated and wild crucifers; and *Myiopardalis* (*Carpomyia*) *caucasica*, Zaitz., widely distributed on melons throughout the region.

[Lebedeva (V. A.).] **Лебедева (В. А.). О мерах борьбы с огородными блошками из рода** *Phyllotreta* **и о влиянии последних на рост и урожайность растений.** [On Methods of Controlling Fleabeetles of the Genus *Phyllotreta* on Vegetables and their Effect on the Growth and Yield of the Plants.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 131–138, 6 figs. Leningrad, December 1924.

The experiments described were carried out under both artificial and natural conditions. The injury to both the growth and the yield of crops as a result of attack by *Phyllotreta* is considerable.

The time of planting has a definite influence on the extent of injury, late-planted crops suffering least. No definite recommendations can, however, yet be made as to the best time for planting the various crops, as delayed planting tends to diminish the yield in some cases. There is also a considerable degree of difference in the susceptibility of different varieties of plants.

Preventive measures thus include the determination of the optimum time for sowing a given crop, the choice of immune or resistant varieties of that crop, and clean cultivation. The stomach poisons that have given the best results are Urania green and Paris green.

[Reikhardt (A.).] **Рейхардт (А.). Новый вредитель крестоцветных** (*Phyllotreta fucata* **Wse.**). [A New Pest of Crucifers, *P. fucata*, Wse.]—**Защита Раст. Вредит.** [*La Défense des Plantes*], i, no. 3–5, pp. 158–159. Leningrad, December 1924.

Phyllotreta fucata, Wse., though not previously considered of economic importance, has been causing considerable injury to various cruciferous plants, particularly turnips and cabbages, during 1924 in the vicinity of Orenburg. It apparently occurs in both European Russia and Turkestan.

[Rimski-Korsakov (M. N.).] **Римский-Корсаков (М. Н.). Лесо-энтомологическое обследование Осиноворощинской дачи.** [Forest-Entomological Survey of the Osinovoroshtchinsk Estate.]—**Извест. Ленингр. Лесн. Инст.** [*Bull. Leningrad Forest Inst.*], no. 32, pp. 151–158. Leningrad, 1925. (With a Summary in German.)

This list of forest insect pests collected on an estate near Leningrad is arranged under the trees attacked. None of the species appear to be of great economic importance, even the attack by bark-beetles being negligible, as all trees are promptly removed after felling and windbreaks seldom occur. A few beneficial insects (parasites and predators) are also recorded.

[Rimski-Korsakov (M. N.). **Римский-Корсаков (М. Н.). О водных наездниках из рода** *Caraphractus* **Haliday.** [Aquatic Parasites of the Genus *Caraphractus*, Hal.]—**Труды Ленингр. Общ. Естеств.** [*Mem. Leningrad Soc. Nat.*], liv, pt. 2, pp. 97–113, 14 figs. (With a Summary in German.) [Leningrad, n.d.]

The Mymarid, *Caraphractus reductus*, sp. n., is described as parasitic on *Dytiscus* near Leningrad. Extensive notes are given on its biology and distribution.

Rostrup (S.). **Kornets blomsterflue** (*Hylemyia coarctata*) **i Danmark 1903-1923. Undersøgelser over dens levevis og bekaempelse.** [The Wheat Fly, *H. coarctata*, in Denmark 1903-1923. Investigations on its Life-history and Control.]—*Tidsskr. Planteavl*, xxx, pp. 713–759, 3 figs. Copenhagen, 1924. (With a Summary in English.)

Hylemyia coarctata has one generation a year; it oviposits in summer, preferably in bare soil (half or total fallow) and to a less

extent in soil not completely covered by plants, the number of eggs laid decreasing with the amount of cover. The eggs winter in the soil, and the larvae appear at the end of February or beginning of March and gnaw the young shoots of winter rye and wheat. At the beginning of May they pupate just below the surface. The eggs are usually laid in August, but oviposition may begin in July or continue into September, depending on the early or late development of the larvae as a result of the weather in spring. The flies prefer light soil for oviposition. The characteristic striped appearance of an infested field is due to the furrows and ridges in which the eggs are scattered and collected as a result of ploughing. Drought in August has been thought to affect the eggs, but in Denmark severe attacks may occur after either a wet or dry August. Ploughing the eggs deep down delays development; the attack is postponed a little, and is then less severe as the plants are larger and more resistant.

The larvae are found on rye, wheat, barley and *Triticum repens*, but not on oats. Though attacked almost as severely as wheat, rye suffers less, as it develops earlier and has a greater propensity to tiller. If a wheat field cannot be saved by manuring with saltpetre, barley should be sown with or without preliminary harrowing, or the wheat should be ploughed under, the field rolled and sown with barley or some other crop. Barley must not be sown until the larvae are almost fully grown, usually about the first week in May. From about 20th July to the end of August the soil where wheat and rye are to be sown should not be left bare. To avoid this either winter wheat or rye should follow root crops, or grass fields should be ploughed at the end of August. The latter measure, however, involves the risk of an attack by *Oscinella* (*Oscinis*) *frit*.

Mokrzecki (Z.). **Walka z kornikiem w polskich Tatrach.** [Control of Bark-beetles in the Polish Tatra.]—*Choroby i szkodniki roślin*, 1925, no. 1, separate, 7 pp. (With a Summary in German.)

An account is given of the unusual outbreak of *Ips typographus*, L., on spruce in the Carpathians at elevations of over 5,000 ft. down to the plains [*cf. R. A. E.*, A, xii, 105]. *I. amitinus*, Eich., occurred in the same trees under the thinner bark. Other species are *Pityogenes chalcographus*, L.; *Pityophthorus micrographus*, L.; *Hylastes* (*Hylurgops*) *glabratus*, Zett., and *H.* (*H.*) *palliatus*, Gyll., only on felled or trap trees (1,968 ft. above sea level); *Polygraphus poligraphus*, L., also common in the plains; *P. grandiclava*, Thom., in the lower dying twigs of *Pinus cembra*; *Xyloterus lineatus*, Oliv., abundant in trap and standing weakened trees; *Dryocoetes autographus*, Rtzb., commonly on felled spruce with thin bark; and *Cryphalus abietis*, Rtzb., usually on spruce, but occasionally on silver fir (*Abies pectinata*).

In certain forests the usual felling operations were suspended, so as not to produce breeding material. The centres of infestation were destroyed, and the attacked trees were barked. The removal of unbarked wood was forbidden. The trap-trees were felled in the spring and barked in the summer, and the destruction of birds was prohibited.

These and other measures reduced the infestation.

Minkiewicz (S.). **Szkodniki pól o ogrodów, obserwowane w Pulawach i okolicy w ciągu 1919 r.** [Field and Garden Pests observed at Pulawy and its Environs in 1919.]—*Mem. Inst. nat. polon. Econ. rur. Pulawy*, i, Pt. A, no. 2, pp. 141–157. Krakow, 1921. (With a Summary in French.) [Received 17th February 1925.]

The garden and orchard pests recorded are: *Heterodera schachtii*, Schm., injuring beet; *Blaniulus guttulatus*, Gerv., attacking peas and causing premature drying of the plants; *Pyrausta nubilalis*, Hb.; *Evergestis extimalis*, Sc.; *Barathra* (*Mamestra*) *brassicae*, L.; *Pieris brassicae*, L.; *Chlorops taeniopus*, Meig., infesting 10 per cent. of the wheat ears in the experimental fields; *Lacon murinus*, L.; *Crioceris merdigera*, F., destroying the leaves of onions; *Sitona grisea*, F.; *Anisoplia segetum*, Hbst.; *Aphis rumicis*, L. (*papaveris*, F.), infesting beans; *Phyllorycter* (*Lithocolletis*) *blancardella*, F., *Recurvaria nanella*, Hb., *Gelechia rhombella*, Schiff., *Hyponomeuta malinellus*, Zell., *H. variabilis*, Zell., *Hemerophila* (*Simaëthis*) *pariana*, L., *Olethreutes variegana*, Hb., and *Malacosoma neustria*, L., on apples; *Porthetria* (*Lymantria*) *dispar*, L.; *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.); *Vanessa polychloros*, L.; *Aporia crataegi*, L.; *Contarinia pyrivora*, Ril.; *Anthonomus pomorum*, L.; *Phyllopertha horticola*, L.; *Epicometis* (*Tropinota*) *hirta*, Poda; *Cetonia aurata*, L.; *Hoplocampa fulvicornis*, Klg., on plums; *Psylla mali*, Schmid.; *Aphis pomi*, DeG.; and *A. pyri*, Koch.

Forest pests are *Phalera bucephala*, L., attacking young oaks particularly in the experimental forests; and *Melasoma populi*, L., and *Eriogaster lanestris*, L., injuring willows.

Minkiewicz (S.). **Przyczynek do rozsiedlenia mszycy welnistej** (*Schizoneura lanigera* **Hausm.**) **w b. Kongresówce.** [The Distribution of *Eriosoma lanigerum*, Hausm., throughout the old Polish Kingdom.]—*Mem. Inst. nat. polon. Econ. rur. Pulawy*, ii, Pt. A, no. 1, pp. 93–98, 1 map. Krakow, 1922. (With a Summary in French.) [Received 17th February 1925.]

This account of the local distribution of *Eriosoma lanigerum*, Hausm., in Poland has been compiled from 500 answers to questionnaires, representing 62 districts.

Kéler (S.). **Korniki (Ipidae) zbiorów Dzialu Entomologicznego Państwowego Instytutu Naukowego w Pulawach.** [Scolytids of the Entomological Department of the Institute of Agricultural Research in Pulawy.]—*Mem. Inst. nat. polon. Econ. rur. Pulawy*, iii, pt. A, pp. 269–276. Krakow, 1922. (With a Summary in English.) [Received 17th February 1925.]

This list contains 45 species of Scolytids, special attention being drawn to *Crypturgus maulei*, Roub., in pine; *C. pusillus*, Gyll.; *Pityogenes trepanatus*, Nördl., in pine; and *Ips subelongatus*, Motch.

Woroniecka (J.). **Szkodniki pól, ogrodów i lasów, występujące na terenie Pulaw i okolocy w 1923 r. Przeglad systematyczno-biologiczny.** [Agricultural Pests of Pulawy and its Environs in 1923.]—*Mem. Inst. nat. polon. Econ. rur. Pulawy*, iv, pt. A, pp. 341–359. Krakow, 1923. (With a Summary in English.) [Received 17th February 1925.]

The agricultural pests recorded during 1923 and not previously mentioned in the report for 1919 (above) are the field and garden pests,

Haplothrips (*Anthothrips*) *aculeatus*, F., on wheat ; *Aeolothrips fasciatus*, L. ; *Limothrips denticornis*, Hal. ; *Pieris rapae*, L., on cabbage ; *Phytometra* (*Plusia*) *gamma*, L. ; *Cydia* (*Laspeyresia*) *nigricana*, Stph. ; *Meligethes aeneus*, F. ; the Elaterids, *Agriotes lineatus*, L., *A. obscurus*, L., and *Corymbites* (*Diacanthus*) *aeneus*, L. ; *Phyllotreta cruciferae*, Goeze ; *P. undulata*, Kutsch. ; *P. atra*, F. ; *P. nemorum*, L. ; *Psylliodes attenuata*, Koch, on hops and hemp ; *Cassida nebulosa*, L., on beet ; *Bruchus* (*Laria*) *rufimanus*, Boh., on beans ; *Sitona lineata*, L., and *S. crinita*, Hrbst., on peas, beans and clover ; *Calandra granaria*, L., in stored grain ; *Apion apricans*, Hrbst., on clover ; *Ceuthorrhynchus assimilis*, Payk. ; *C. sulcicollis*, Gyll. ; *Oscinella* (*Oscinis*) *frit*, L., on spring wheat and rye ; *Psila rosae*, F., on carrots ; *Phorbia* (*Anthomyia*) *brassicae*, Bch., on young cabbage plants ; *Mayetiola destructor*, Say ; *Perrisia* (*Dasyneura*) *brassicae*, Winn., very injurious to turnips ; and *Cephus pygmaeus*, L., on grain crops, which apparently overwinters on wild mustard (*Sinapis arvensis*) at the edges of fields.

The orchard pests are *Psylla pyrisuga*, F. ; *Anuraphis helichrysi*, Kalt. (*Aphis pruni*, Koch) ; *Lepidosaphes ulmi*, L. (*Mytilaspis pomorum*, Bch.) ; *Notolophus* (*Orgyia*) *antiquus*, L., occurring in two generations ; *Cydia* (*Laspeyresia*) *pomonella*, L. ; *Eucosma* (*Tmetocera*) *ocellana*, F. ; *Argyroploce variegana*, Hb. ; *Blastodacna putripennella*, Zell., recorded for the first time, the larvae passing the winter in the ends of thin twigs of apple trees and boring upwards in the young shoot in the spring ; *Tetrops praeusta*, L. ; *Magdalis ruficornis*, L. ; *Phyllobius oblongus*, L. ; *Anthonomus cinctus*, Koll., on pear, the winter being passed in the adult stage ; *A. druparum*, L. ; and *Rhynchites pauxillus*, Germ.

Forest tree pests are *Aradus cinnamomeus*, Panz., responsible for the breaking of the bark of young pine trees ; *Rhyacionia* (*Evetria*) *buoliana*, Schiff., occurring in the same forest and destroying the tops of the trees ; *Dioryctria abietella*, F. ; *Cydia* (*Laspeyresia*) *strobilella*, L. ; *Thecodiplosis brachyntera*, Schwäg., at the base of pine needles, causing them to become yellow and drop off ; *Myelophilus minor*, Hart., on pine ; *Diprion* (*Lophyrus*) *pini*, L., on pine, particularly 16- to 20-year-old trees, devouring the needles of the previous years ; and *Phyllodecta vittelinae*, L., on willow.

Woroniecka (J.). **Spostrzezenia nad wystepowaniem pryszczarka** (*Mayetiola destructor* **Say.**) **w Pulawach i okolicy w 1923 roku.** [Observations on the Appearance of the Hessian Fly (*M. destructor*) in Pulawy and its Environs in 1923.]—*Mem. Inst. nat. polon. Econ. rur. Pulawy*, iv, pt. A, pp. 360–368. Krakow, 1923. (With a Summary in English.) [Received 17th February 1925.]

From the observations made during 1923, *Mayetiola destructor*, Say (Hessian fly) is likely to be more abundant and more widely distributed in Poland during 1924 ; this is partly due to the lack of parasites. These were only obtained from the pupae of the autumn generation, and are probably *Trichalcis remulus*, Wlk.

In the government of Lublin, under normal conditions, only two generations occur in a year, though with exceptionally favourable weather conditions a complete third may develop. Wheat is generally more severely injured than rye ; *Agropyrum repens* was also attacked.

MÜLLER (A.). **Das Aehrenglöckel** (*Buddlea variabilis* **Hemsley**) **eine für Tagfalter, insbesondere den Kohlweissling** (*Pieris brassicae* **L.), spezifische Köderpflanze.** [*B. variabilis*, a specific Bait-plant for Butterflies, especially the Cabbage White, *P. brassicae*.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 2, p. 11. Berlin, 1st February 1925.

The strongly scented blossoms of *Buddlea variabilis* attract large numbers of butterflies, especially *Pieris brassicae*, L. It is suggested that this shrub may be utilised to facilitate the collection of the adults.

FISCHER (W.). **Lysol als Spritzmittel.** [Lysol as a Spray Insecticide.] —*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 2, p. 12. Berlin, 1st February 1925.

In the course of an outbreak of *Lygus pratensis*, infesting potatoes at Hanover, a trial was made against this pest with a 4 per cent. solution of lysol, but it was found that any strength higher than 0·25 per cent. is apt to scorch the plants without affecting the bugs.

SCHWARTZ (—). **Anleitung zur Bekämpfung des Kartoffelkäfers.** [A Guide to Work against the Potato Beetle.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 2, p. 15. Berlin, 1st February 1925.

The measures to be taken if the presence of the Colorado potato beetle [*Leptinotarsa decemlineata*] has been ascertained are briefly described.

Amtliche Pflanzenschutzbestimmungen. [Official Regulations on Plant Protection.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst.*— Beilage [Suppmt.], no. 2, pp. 17–32. Berlin, 1st February 1925.

The first issue of this publication has already been noticed [*R.A.E.*, A, xii, 515]. Besides regulations by the Saxon and Wurttemburg governments against the Colorado potato beetle, the text of the changes in the Italian laws against *Phylloxera* is given.

SCHLÖSSER (J.). **Meine Erfahrungen mit Arsenbrühen zur Bekämpfung von Obstbaumschädlingen.** [My Experiences with Arsenical Sprays for combating Fruit-tree Pests.]—*Anz. Schädlingskunde*, i, nos. 1–2, pp. 4–5, 19–21. Berlin, January & February 1925.

Urania green is said to be superior to Paris green because it more readily remains in suspension in fluids. Not more and not less than one-eighth per cent. of arsenic should be present in the spray. If used to prevent outbreaks of pests, the latter will confer extensive protection, but if its application is delayed the effect is more or less remedial only.

SPRENGEL (L.). **Wie steht es mit der Ausbreitung des Kartoffelkäfers (Koloradokäfers,** *Leptinotarsa decemlineata*) **in Frankreich?** [What is the Position as regards the Spread of *L. decemlineata* in France?]—*Anz. Schädlingskunde*, 1, no. 2, pp. 13–18, 3 figs. Berlin, February 1925.

This is a summary of the information already published on the question. It is stated that the position in France is not so serious as

believed by the German authorities ; the numbers of foci of *Leptinotarsa decemlineata* have decreased and are limited to the department of Gironde and a small portion of the adjoining ones ; the infested area did not increase during 1924.

PRELL (H.). **Zikaden als Feinde des Besenginsters.** (*Tettigonia viridis* **L. auf** *Sarothamnus scoparius* **Wim.).** [Homoptera as Pests of Broom.]—*Anz. Schädlingskunde*, i, no. 2, pp. 21–23. Berlin, February 1925.

Except for instances of infestation of willows by the Cercopid, *Aphrophora salicis*, Fall., bugs are not recorded as pests of any importance in forestry. The Jassid, *Tettigoniella* (*Tettigonia*) *viridis*, L., has however done considerable injury to broom seedlings [*Cytisus scoparius*] in Germany. To minimise loss of seed the broom had been sown in beds where the growth of the young plants was subsequently found to be very irregular, some being only one-third the height of others and with very slender shoots covered with punctures. *T. viridis* lives normally on *Scirpus*, and this plant was growing near the seed-beds, so that their infestation was evidently due to a migration from some unknown cause.

JEGEN (G.). **Maikäferbekämpfung.** [Work against Cockchafers.]—*Landw. Jahrb. Schweiz*, xxxviii, pt. 5, pp. 629–630. Bern, 1924. [Received 14th February 1925.]

Mating of cockchafers [*Melolontha*] occurs during the first flight, and oviposition begins 4–8 hours later. The 40–50 eggs are laid in 5–10 batches, the female appearing at the surface of the ground after each deposition and boring down at another spot for the next. After oviposition, which usually is completed within 24 hours of the first flight, the females often fly for 2 or 3 nights. Capture is, therefore, not effective enough to destroy a sufficient number of females prior to oviposition, as many taken after the first night of flight have already partly oviposited.

JEGEN (G.). **Blutlausübertragungsversuche zur Festellung der Widerstandsfähigkeit der verschiedenen Obstbaumsorten.** [Experiments in transferring Woolly Aphis in order to ascertain the Power of Resistance of various Fruit Trees.]—*Landw. Jahrb. Schweiz*, xxxviii, pt. 5, pp. 630–631. Bern, 1924. [Received 14th February 1925.]

Experiments made by placing the woolly aphis [*Eriosoma lanigerum*] on apple twigs, a gauze bag being used to enclose the material, showed that Cox's Orange, Blenheim Orange and Landsberg Reinette are immune, while other varieties are partly so. Aphids taken from two varieties of apple behaved differently, except that none infested the three varieties mentioned.

SCHIRBER (E.). **Sur** *Sesamia nonagrioides*, **Lef. (Lépidoptères),** *Pyrausta nubilalis*, **Hb., et leur Chenilles.**—*Proc.-verb. Soc. linn. Bordeaux*, lxxvi, no. 2, pp. 106–107. Bordeaux, 31st December 1924.

Sesamia vuteria, Stoll (*nonagrioides*, Lef.) has two generations a year in the Gironde, and is found in the stems of maize in company with *Pyrausta nubilalis*, Hb. The larvae generally succumb to a moderately cold winter.

SCHIRBER (E.). **Sur** *Abraxas pantaria*, **L. (Lépidoptères).**—*Proc.-verb. Soc. linn. Bordeaux*, lxxvi, no. 2, p. 128. Bordeaux, 31st December 1924.

This paper on *Abraxas pantaria*, L., infesting ash in France, has been noticed from another source [*R.A.E.*, A, xii, 503].

FAURE (Jean C.). **Etude sur la Psyché des montagnes.**—*Bull. Office agric. rég. du Midi*, reprint 9 pp., 3 figs. [*sine loco*] October 1924. [Received 11th February 1925.]

Oreopsyche angustella, H.S. (*Psyche atra*, Esp.) has been for many years a serious pest of pasture lands in the mountains of central France. An investigation into the biology of the moth in Loire and Ardèche has shown that the larvae begin their depredations as soon as the snows have melted. They pupate in the first half of June. The time of emergence of the moths is very variable, depending chiefly on the temperature and altitude, but generally occurs rather late in June or early in July. The eggs remain within the female moth, which dries up and dies as the young larvae hatch. The latter make protective cases for themselves with dried grass, etc., which they carry, and into which they retreat when disturbed. Before pupating, the larva fastens its case with silk threads to a stone or tree trunk or to the ground. *Tachina mimula*, Meig., has been recorded as a parasite of *O. angustella*; the author did not obtain any parasites, but found a Carabid predacious on the larvae. The damage caused by the feeding of this moth and the measures suggested for its control have been previously noticed [*R.A.E.*, A, xii, 390].

VOUKASSOVITCH (P.). **Observations biologiques sur un Diptère,** *Isobremia kiefferi*, **n. sp., parasite des Pucerons.**—*C.R. Soc. Biol.*, xcii, no. 5, pp. 357–359. Paris, 13th February 1925.

Isobremia kiefferi, sp n., has been found attacking *Macrosiphum rosae*, *Myzus rosarum* and *Aphis kochi*, as well as other unidentified Aphids. The eggs are laid on the plant near the host. Each larva kills several Aphids. Pupation occurs amongst débris, etc. Under artificial conditions the larvae were full grown in 4 days at an average temperature of 20° C. [68° F.]. The prepupal stage lasts from 3 to 10 days, and the pupal stage about 7, the latter at an average temperature of 24° C. [75·2° F.]. Under natural conditions several successive generations were noticed throughout the summer. The larvae of *I. kiefferi* were parasitised by the Proctotrupid, *Synopeas rahnis*, Wlk.

Barbey (A.). **Traité d'Entomologie forestière.**—2nd edn., 8vo, xviii + 749 pp. 8 pls., 498 figs. Paris, Nancy & Strasburg, Berger-Levrault, 1925. Price *Frs.* 50 net.

This is a second edition, revised and augmented, of a work published in 1913 [*R.A.E.*, A, i, 533]. In view of the necessity of re-establishing the forests of the devastated regions of France and of developing fresh plantations, it is of the utmost importance at the present time that the biology of forest pests should be understood, and also that a judicious selection should be made of the species of tree to be planted, particularly as it is in the new, artificially created, pure stands that breeding of insect pests is most prolific. This is especially likely to occur in new stands of conifers such as pine, spruce, larch, etc. Certain insects, formerly rare in France, but injurious on the other side of the Vosges (*Hylobius*, *Lyda*, *Lasiocampa*, Bostrychids, etc.), are breeding in numbers, and it is only by a knowledge of their biology that remedies can be successfully and economically carried out.

The aim of this book is to enable the practical forester to determine the species with which he has to deal, and to suggest suitable remedies for them.

The arrangement of the information follows the plan of the first edition, and, besides other additions and revisions, there are new chapters dealing with the pests of exotic species acclimatised in Europe, and with parasites and predators of forest insects. Included are indices to the genera and species mentioned, a bibliographical index, and one to the plates and figures.

Marchal (P.). **Utilisation d'une Coccinelle australienne** (*Cryptolaemus montrouzieri*, **Muls.**) **dans la lutte contre les cochenilles blanches et son introduction en France.**—*Ann. Epiphyties*, viii (1921), pp. 1–2. Paris, 1922. [Received 14th February 1925.]

An account is given of the introduction into France of the Coccinellid, *Cryptolaemus montrouzieri*, Muls., from California, as a means of controlling mealybugs, and in particular *Pseudococcus citri*, Risso.

Poutiers (R.). **L'acclimatation de** *Cryptolaemus montrouzieri*, **Muls. dan le midi de la France.**—*Ann. Epiphyties*, viii (1921), pp. 3–18, 12 figs. Paris, 1922. [Received 14th February 1925.]

This is a detailed account of the introduction, rearing, dissemination and establishment of the Coccinellid, *Cryptolaemus montrouzieri*, Muls., in France [see preceding paper]. Colonies were released chiefly in the regions of Mentone, Monaco, Beaulieu and Villefranche, some being sent also into Italy. The first rearings were begun at Mentone in 1918, and by May 1920 the Coccinellids were breeding in the fruit groves. Biological and morphological observations are recorded. The life-cycle during summer in the south of France requires about 40 days (*Pseudococcus* requiring from 45 to 50 days). In October, a few eggs were still being laid but required 18 to 20 days for incubation. Four generations occur in the year, but overlap, so that all stages may be found from May to October. Adults usually live from 1 to 2 months. Hibernation seems to begin at the end of October in the pupal stage and about mid-November in the adult stage. Other insects attacking *Pseudococcus* do not seem to affect the development of the Coccinellids, but they should be protected from *Iridomyrmex*

humilis, Mayr (Argentine ant) by setting for the latter bait traps containing weak arsenical salts. Until *C. montrouzieri* is well established along the whole Mediterranean coast, reserves must be kept in the laboratories for use in case of emergency.

LÉCAILLON (—) & AUDIGÉ (—). **Sur les propriétés insecticides du Toluène.**—*Ann. Epiphyties*, viii (1921), pp. 19–25. Paris, 1922. [Received 14th February 1925.]

The authors have tested the insecticidal properties of toluene both in the gaseous and liquid form. Both in the open and in buildings, the gas acted as a repellent, driving the larvae of sawflies, *Vanessa* sp. and the vine moth, *Clysia* (*Conchylis*) *ambiguella*, from their food-plants, and flies, mosquitos, etc., out of buildings. It is, however, very inflammable. A table shows the results of fumigation in a closed space. The action of the gas was found to increase rapidly with the temperature; at 40° C. (104° F.) a very small quantity was sufficient to kill all insects present within a few minutes. This is explained by the fact that a rise in temperature produces a corresponding rise in activity of the insects, and therefore breathing, with the consequent absorption of toxic gases, becomes more rapid. At a given temperature the fatal dose depends on the length of exposure to the gas, which must be long enough to force the insects to re-open the stigmata for breathing after having closed them for protection.

As a liquid, toluene is by far the most powerful insecticide that has been tried. Larvae of *Colaspidema* and of the above species when touched with a drop of the liquid were killed instantly, while a few drops placed on an egg-mass of *Colaspidema* prevented about 80 per cent. of the eggs from hatching. The woolly aphis [*Eriosoma lanigerum*] on apple branches was killed rapidly by spraying with toluene, but it can only be applied in the dormant season. Furniture was cleared of Anobiid larvae by washing and injecting toluene into the holes.

PIEDALLU (A.). **Expériences sur la destruction des insectes nuisibles aux grains et aux légumes secs.**—*Ann. Epiphyties*, viii (1921), pp. 309–311. Paris, 1922. [Received 14th February 1925.]

Experiments are described in which carbon tetrachloride and chloropicrin were used as fumigants against *Ephestia*, Bruchids and weevils in dried vegetables and grain. The former is practically harmless, provided that the operator does not remain within the fumigation chamber, and gave successful results in a hermetically sealed chamber at a dose of 7 oz. per 35 cu. ft. operating for 48 hours. It is practically useless, however, for imperfectly-closed buildings such as silos. Chloropicrin is much more active and gives excellent results at a strength of one-third oz. per cu. ft. in a tent sealed with clay. The method of preparing the tent and of making and applying the clay is described.

MARCHAL (P.). **La question des races du Phylloxéra de la vigne.**—*Ann. Epiphyties*, ix, no. 6, pp. 411–418. Paris, 1923. [Received 14th February 1925.]

The work of Börner and other authors regarding the occurrence of *Phylloxera* on vines and the resistance of certain species to attack is discussed. Recent research has indicated a new order of factors

depending not so much on the nature of the plant or the influence of its surroundings as on the insect itself, which shows distinct biological races capable of producing different reactions in the plant. It seems, for example, that a certain type of *Phylloxera*, owing to the absence or scarcity of American vines, will reproduce parthenogenetically for a number of years exclusively on European vines, and will thus become so modified as to be unable to resume its normal cycle on American vines. This is analogous to the formation of special native races that have been discovered in *Chermes*, and, more recently, in the woolly aphis [*Eriosoma lanigerum*]. The author raises the question whether Börner's Lorraine *Phylloxera*, which is widely distributed in Europe and appears sporadically in many countries, may not have developed its distinguishing characters by many years of reproduction on European vines without the intervention of any sexual generation. So also, if the sexual generation is brought to an end experimentally (as in Börner's experiments), the descendants will behave differently from the *Phylloxera* that have continued to reproduce normally on American vines. This would explain Börner's contention that the Lorraine *Phylloxera* produces galls on the European vines and not on the American vines that usually have them; for, in the same race, the winged forms are more attracted by the European than by the American vine, and in consequence the winter egg will be found especially on the former. The study of Aphids and their life-cycle all tends to confirm this theory. A knowledge of the races and biological peculiarities of the vine *Phylloxera* is obviously of the utmost importance in the choice of vine stock; in particular the insect should be studied in its original habitat on the various species of wild American vines.

VAYSSIÈRE (P.). **Note préliminaire sur les Monophlebinae (Hemiptères-Coccides). Détermination des genres.**—*Ann. Epiphyties*, ix, no. 6, pp. 419–429, 12 figs. Paris, 1923. [Received 14th February 1925.]

This is a preliminary note from a fuller work on Coccids that will appear later, and deals only with the MONOPHLEBINAE. The author bases his generic divisions of this subfamily on the characters of the adult female and the first stage larva, and a table of the genera is given, including a new one, *Marchalina*.

WILLAUME (F.). **Les données actuelles sur les végétaux insecticides.**—*Ann. Epiphyties*, ix, no. 6, pp. 431–441. Paris, 1923. [Received 14th February 1925.]

An account is given of the use that has been made of various plants as insecticides, the chief being tobacco, pyrethrum, hellebore, quassia and derris. The work of McIndoo and Sievers in this connection is reviewed [*R.A.E.*, A, xii, 244], as well as that of various French authors. It is thought that future experiments on these lines are worth more care and attention; that the methods of extraction should be more uniform and more carefully described, and that search should be made for further solvents and other factors. The effect of the mode of application and the apparatus used should also be carefully considered, as well as the state of the plant when ready for gathering and the locality in which it is produced. Among the factors influencing the

yield of the plant in insecticidal properties are heredity, climatic conditions, nature of the soil and cultural practices. Study of the subject must be based on a knowledge of the summary observations previously made. The indications point to the possible value of Compositae, Solanaceae, and, to a less degree, of Liliaceae, Ranunculaceae and Euphorbiaceae, but there seem to be many exceptions. Further researches should indicate which native species would be worth using, either in the wild or cultivated state, and which foreign species would be worth acclimatising for this purpose.

[Reports on the Work of the Entomological Stations of Paris and the South of France for the year 1922.]—*Ann. Epiphyties*, ix, no. 6, pp. 443–463. Paris, 1923. [Received 14th February 1925.]

This includes a number of reports from the heads of the entomological stations at Paris, Mentone, Rouen, Bordeaux, Saint-Genis-Laval and Chalette-Montargis. The chief work at Mentone has been the rearing of the introduced parasites, *Novius cardinalis*, *Cryptolaemus montrouzieri* and *Aphelinus mali*. *Opius concolor*, the Tunisian parasite of the olive-fly [*Dacus oleae*], has also been reared in captivity. At Cannes the widespread use of shelter-traps has reduced the numbers of the Argentine ant [*Iridomyrmex humilis*] to such an extent as to permit a resumption of the cultivation of certain crops (beans, vines, etc.) which had been abandoned. The occurrence of *Acarapis woodi* in bee-hives in the Alps has been studied ; apparently this mite occurs in different regions throughout France, but is not regarded as of much importance. It is not considered certain that this parasite alone is sufficient to cause Isle of Wight disease. The presence of *Ceratitis capitata* is reported from Mentone, where late peaches and pears have been seriously damaged by the larvae, oranges not being attacked. Investigations on *Anthonomus pomorum* in Rouen have led to the conclusion that insecticides, and particularly lead arsenate sprays, should not be used for cider apples, although they might be used at the moment of the buds opening, but that the value of the crop does not warrant the expenditure. In the transmission of bacterial canker of poplar the larvae of *Cossus*, *Aegeria* (*Sesia*), and of *Idiocerus populi* seem to be important factors. The Bordeaux Station has been chiefly concerned with the campaign against the Colorado potato beetle [*Leptinotarsa decemlineata*] under the direction of Dr. Feytaud, which has been noticed from other sources. In the Saint-Genis-Laval (Rhône) district attempts are being made to find a substitute for the American proprietary adhesives used for banding [*cf. R.A.E.*, A, xi, 340]. An attempt has also been made to use the residue sulphur left after refining, in association with calcium arsenate, in the usual formula for pear and apple treatments ; this was successful, but further tests are necessary with regard to scorching of the foliage. The American "dry lime-sulphur" has also been produced and will be experimented with. A study of the transmission of leaf-curl and allied diseases of potatoes has led to a different conclusion from that reached by Quanjer [*R.A.E.*, A, x, 236] regarding the part played by insects. Healthy tubers were placed under frames in prepared and manured soil ; some were protected from insect attack, while with the others were placed diseased leaves of potatoes heavily infested with *Myzus persicae*, *Macrosiphum solani*, *Aphis rumicis* (*euonymi*) and *Typhlocyba* spp. Neither leaf-roll, leaf-curl nor mosaic disease was

produced. Further experiments are, however, desirable before a definite conclusion is reached. During the colonisation of *Aphelinus mali* at Chesnoy it was found that the presence of *Exochomus quadripustulatus* interfered with its multiplication.

TROUVELOT (B.). **Recherches de biologie appliquée sur la teigne des pommes de terre et ses parasites et considérations générales sur l'utilisation des Insectes entomophages en agriculture. Etude des conditions de pullulation des insectes.**—*Ann. Epiphyties*, x, nos. 1 & 2, pp. 1–132, 4 pls., 32 figs. Paris, 1924. [Received 19th February 1925.]

The area infested by *Phthorimaea operculella* (potato tuber moth) in France, situated on the coast of the Department of Var, has not extended much since the account written in 1913 by Picard [*R.A.E.*, A, ii, 400], on whose work the present study has been based. The severity of the infestation has even decreased to some extent, owing partly to the reduction in potato-growing (due largely to the presence of the moth) and partly to the general application of the measures for protecting stored tubers advocated by Picard. As soon, however, as any extensive cultivation is undertaken in the infested area the moth begins to increase to epidemic numbers ; it therefore constitutes a serious menace, and if it should spread, for example, to the lower Durance Valley, where late-season potatoes are largely grown, very serious losses would be incurred. Picard having proved the possibility of protecting the tubers, a study has now been made to discover a means of preventing infestation before the crop is gathered, and as the tubers may be attacked by moths or migratory larvae entering through crevices in the soil, deep planting, in sandy soil that is not liable to cracking, repeated earthing up, and early pulling up of the plants are advocated. Insecticides, in the present state of knowledge of their action, cannot be recommended. Control by biological methods offers a promise of success, and has been studied in detail. Natural enemies that have some effect in reducing the numbers include the mite, *Pediculoides ventricosus*, and the predacious ant, *Pheidole pallidula*, but parasites are practically negligible. Attention was therefore turned to the valuable parasites occurring in California, and *Habrobracon johanseni* was introduced into France. This species develops rapidly (in 12 days during the summer), while the period of oviposition is extensive (30 days in summer), one female laying an average of 200 eggs ; and its destructive action on *P. operculella* is considerable, the larvae being used by the Braconid both for food and for oviposition purposes. As the host larvae provide food, there is no fear of a famine during dry periods. The manner of feeding on the host larvae, which is by the suction tube method, is described in detail, as well as the process of oviposition, which is almost exclusively on larvae of *P. operculella* that have completed their development and have just constructed their cocoon. Moreover, the parasites will discover and attack their host when in situations that protect them entirely from ordinary artificial methods of control. Other hosts are occasionally attacked, and *H. johanseni* has been reared experimentally from larvae of *Platyedra* (*Gelechia*) *gossypiella* and from the vine moth [*Polychrosis botrana*]. It is thought that *Pyrausta nubilalis* might also prove a suitable host. It has been proved that *H. johanseni* can easily withstand the French climate

during the winter, and, in fact, breeds and is active throughout the year, the generations being indistinguishable and all stages being found at once. The methods of rearing and acclimatisation of the parasite in France are described. As a result of continuous breeding, the parasite is capable of keeping a continual check on the moth and should rapidly control any outbreaks, even if it only occurs in small numbers at the beginning. It will, however, require the experience of several years' work with the parasite in the field before its value can be accurately estimated, and even if complete success should attend the attempt to establish it, the other measures of control recommended against *P. operculella* should be continued as rigorously as before.

Certain biological features of the moth and of its parasite are discussed, as well as the parasitic interactions, and some general notes on the acclimatisation of foreign entomophagous insects are added.

POUTIERS (R.). **Utilisation et élevage des Insectes auxiliaires.**—*Rev. Zool. agric. & appl.*, xxiii, no. 12, pp. 273–279, 1 pl., 1 fig. Bordeaux, December 1924.

Further notes are given regarding the method of rearing insects for purposes of biological control [*R.A.E.*, A, xii, 95], the species dealt with including *Cryptolaemus montrouzieri* and *Rhizobius lophantae*. The particular difficulties met with in attempting to rear Hymenopterous parasites are discussed, and special rearing boxes that have been adapted for this work are described. For the rearing of *Opius concolor* and for small Hymenoptera parasitic on Coccids different methods are adopted. Personal initiative is the greatest factor in this work, for constant modifications are required to meet almost every separate case.

FAURE (Jean C.) & ALABOUVETTE (L.). **Note sur l'*Anarsia lineatella*, Zell., et ses parasites dans la région de Lyon en 1924.**—*Rev. Zool. agric. & appl.*, xxiii, no. 12, pp. 279–287, 4 figs. Bordeaux, December 1924.

Notes are given on the biology and seasonal history of *Anarsia lineatella*, Zell., in France, where the larvae attack peach, almond, apricot and plum. A list of Hymenopterous parasites recorded from other countries is given; those observed in France during the present study include the Chalcid, *Paralitomastix variicornis*, Nees, and the Braconids, *Apanteles emarginatus*, Nees, and *A. xanthostigmus*, Hal., var. *anarsiae*, n., all from the larvae, and the Ichneumonids, *Phygadeuon rusticatus*, Wsm., and *Hemiteles incisus*, Bridg., from the pupae. The last two are apparently both new to France. The proportion of the first generation of *A. lineatella* killed by parasites in the St. Genis-Laval region in 1924 was 70 per cent., *P. variicornis* being responsible for 37 per cent., *A. xanthostigmus* var. *anarsiae* for 17 per cent., and *P. rusticatus* for 11 per cent. It is thought that many of the young larvae die also as a result of the gummy exudation, which is a reaction of the peach tree.

The measures against *A. lineatella* practised in America are briefly reviewed. In France copper sulphate sprays, with the addition of 1½ lb. of pure nicotine or 10 lb. commercial triplumbic arsenate per 100 gals. of spray, have given great success when applied from the time the buds open. One treatment was found to be sufficient.

Bruneteau (J.). **Sur l'éclosion de l'oeuf chez le Doryphore** (*Leptinotarsa decemlineata*, **Say**).—*Rev. Zool. agric. & appl.*, xxiii, no. 12, pp. 289–291. Bordeaux, December 1924.

The method of hatching of the eggs of *Leptinotarsa decemlineata*, Say (Colorado potato beetle) has been observed in the laboratory, and is here described, being found to confirm the observations of Wheeler made in 1889. In the case of females fertilised in 1923 and isolated at the moment of hibernation, 25 per cent. of the eggs laid in 1924 dried up and died. Of those obtained from rearing in 1924 and fertilised during the season, the proportion of sterile eggs was only 9 or 10 per cent.

Imms (A. D.). **A General Textbook of Entomology.**—8vo, xii + 698 pp., 607 figs. London, Methuen & Co., Ltd., 1925. Price 36*s.* net.

This book, which the author describes as the outcome of a number of years' experience of the need of a treatise that will meet the requirements of the research worker, the advanced student and the teacher, presents the chief facts concerning the structure, physiology, development and classification of the Insecta, and the biology of some of their more important representatives. Much material has been introduced that has not previously appeared in text-books, the object throughout being to present the essentials, and, at the same time, to indicate where fuller information is available, by means of bibliographies at the end of each section.

The sections are grouped under the three main headings, parts i and ii, which are devoted to the anatomy and physiology, and development and metamorphosis of insects in general, and part iii, classification, in which the orders are dealt with separately. In the latter part the anatomy and development as exhibited in the various orders, etc., are discussed ; and notes are given on the families, illustrated with references to species, particularly those of economic significance, with short accounts of their habits. Keys to the families are included.

Samman (C.) & Gatenby (J. B.). **Notes on Acarine or Isle of Wight Bee Disease.**—*Scientif. Proc. R. Dublin Soc.*, N.S. xvii, no. 46, pp. 357–363, 2 pls. Dublin, August 1924. [Received 11th February 1925.]

It is known that the cause of Isle of Wight disease in bees is the mite, *Acarapis woodi*, the females of which leave the thoracic tracheae of infected bees and wander into those of healthy ones, living on the haemocoel fluid of the bees. The mites might be killed in several ways : in the tracheae, by feeding the bees on some substance that might so affect the haemocoel fluid of the host as to make it toxic to the parasites, or by some gas or fumigant that would poison the mites without injuring the bees ; on the surface of the bees, by sprinkling the hive with some substance that would come into contact with the gravid female mites and prevent newly emerged bees from becoming infected ; or by the discovery of a method of preventing clean stocks of bees from becoming infected. Some of these have been tried, without any outstanding success from any of them. The authors have conducted experiments with the object of trying to destroy the parasite by the first-named method. Incidentally, their work confirmed

previous findings, that during winter the mites breed very slowly, and in many cases not at all, and also that the brood is not diseased before emergence. Four diseased bee stocks were treated with drugs in their food during the winter months of 1923-1924. To the ordinary commercial candy generally used as food during the colder months drugs were added as follows: Garlic juice of about 15 per cent. strength in water, sugar added as necessary according to the thickness of food desired; Yadil candy of 22 per cent.; and each of the above followed by a treatment of Stockholm tar in candy of 5 per cent. In the Yadil treated hive the rate of infection dropped markedly with the emergence of new bees, but infection steadily increased again until the stock died out. With garlic juice the results were more encouraging. One stock, beginning at 10 per cent. infection, remained fairly uniform except for a sudden rise in December, and then fell until all bees examined were negative; this stock is still negative and healthy. The other stock treated with garlic juice and tar seemed to have been poisoned by the tar, but would probably have been cured had the tar treatment been omitted. These results, although not by any means convincing, do indicate that an efficient treatment of Acarine disease might be found on these lines. Garlic can easily be grown by beekeepers, the bulbs can be dug up and the juice expressed and mixed up to 15 per cent. strength with sugar. The treatment should be tried during the winter months when the bees are clustered.

TATTERSFIELD (F.), GIMINGHAM (C. T.) & MORRIS (H. M.). **Studies on Contact Insecticides. Part i. Introduction and Methods. Part ii. A Quantitative Examination of the Toxicity of** *Tephrosia vogelii*, **Hook., to** *Aphis rumicis*, **L. (the Bean Aphis).**—*Ann. App. Biol.*, xii, no. 1, pp. 61–76, 3 graphs. Cambridge, February 1925.

The search for some substance that would prove an adequate alternative to nicotine as a contact insecticide forms the primary object of these investigations. In this connection the price and supply of the substance are important factors. The experiments were carried out with *Aphis rumicis*, L. (bean aphis), the apparatus and technique employed having already been described [*R.A.E.*, A, xii, 225]. Ten insects were used for each individual test, but in future work, with a limited number of selected compounds or groups of compounds, it will be necessary to use a larger number for each test and to compare toxicities on as many different types as possible. In dealing with a solid organic base insoluble in water, it was found best to use an organic solvent immiscible with water and to work the solution up into the form of an emulsion. For this purpose benzene was chosen; this substance shows no appreciable toxicity to the insects, and although almost completely immiscible with water, it gives good emulsions when shaken with a 1 per cent. saponin solution. In some cases it was necessary to add small amounts of alcohol and ether to the benzene; in such cases special control tests with the mixtures of solvents were carried out. Saponin solution of 1 per cent. was not toxic to *A. rumicis*, and it was thus superior to soft soap for these experiments.

The distribution of *Tephrosia vogeli* is reviewed; it is a shrub 8-10 ft. high, with woody branches covered with dense spreading foliage, and is found in West Africa, the Sudan, Rhodesia and the Comoro Islands. It has been experimentally cultivated in the West

Indies and in Java for green manure. Other species of the same genus are probably worth investigation as sources of insecticides. The toxic principles of *T. vogeli* have been studied by Hanriot and others, who isolated three products: a yellow material crystallising in needles; a white crystalline compound, tephrosin; and a volatile substance with a strong aromatic odour, tephrosal. Pure tephrosin is apparently insoluble in water, more soluble in acetone and completely soluble in chloroform. The formula ascribed to it by Hanriot is $C_{31}H_{26}O_{10}$. Tephrosal with approximate formula $C_{10}H_{16}O$ begins to distil *in vacuo* about 60° C. [140° F.]; is only slightly soluble in water, partially soluble in alcohol and completely soluble in ether and chloroform. Tephrosin proved to be extremely toxic to fish, but the yellow substance and tephrosal were less so.

The spray used on *A. rumicis* was made from a finely ground powder extracted with alcohol by percolation in the cold (in the case of the leaves with ether and tetrachloride also), the solvent being partially evaporated on the water bath and finally in a vacuum desiccator. The extracts were taken up in the smallest possible quantity of benzene and made up to the required concentrations with 1 per cent. saponin solution in water. Extracts of the leaves and seeds proved highly toxic to Aphids (stems are less toxic), their toxicity being of the same order as that of nicotine. Though the authors had no opportunity of isolating Hanriot's tephrosin, there appears to be no doubt that this substance is responsible for the results obtained with Aphids. As the dried extracts obtained by the use of organic solvents are difficult to work up into an emulsion for spraying, spray fluids obtained by simple aqueous extractions were tested. Weighed quantities of the leaves, seeds and stems were allowed to stand for some time with distilled water. The mixture was then filtered until clear and saponin added to bring its content up to 1 per cent.; dilutions were then made with 1 per cent. saponin solution and sprayed in the usual way. The stems were least toxic and less so than those prepared by alcoholic percolation from the same weight of material. In the case of the leaves some wetting material such as saponin appears to be necessary in practical use, a 1 per cent. concentration then being completely toxic, but in the case of the seeds aqueous extracts without saponin proved equally effective at as low a dilution as 0·75 per cent. of the seeds. The concentrated mixture in the latter case was prepared of as thick a consistency as could be drawn through the nozzle of the spraying machine, and it may be that some of the effect is mechanical. The results are therefore not strictly comparable with the others discussed, but confirm the high toxicity of the seeds. In practice it would appear that aqueous extracts of the ground leaves are most suitable for general use. Soft soap may be safely used with aqueous extracts. Tests to ascertain whether this material acted as a stomach poison to caterpillars (*Selenia tetralunaria*, Hufn.) were not very conclusive, as the foliage was rendered so repellent that the majority of the larvae refused to feed. The experiment, however, showed that the extracts had no deleterious action on the foliage of hazel.

Smith (K. M.). **Further Experiments in the Control of Certain Maggots attacking the Roots of Vegetables.**—*Ann. App. Biol.*, xii, no. 1, pp. 77–92. Cambridge, February 1925.

The life-histories of the four insects concerned in these trials, ***Hylemyia antiqua***, Meig. (onion fly), *Psila rosae*, F. (carrot fly),

Phorbia (*Chortophila*) *brassicae*, Bch. (cabbage root fly) and *Ceuthorrhynchus pleurostigma*, Marsh. (turnip gall weevil), are somewhat similar, the larval stage in each case being spent in the roots of the various vegetables. In Cheshire and Lancashire, where these observations were made, the first three are the most troublesome insects pests of the market garden. Further experiments have been made with various chemicals against these pests [*R.A.E.*, A, xi, 126] which show that a nicotine sulphate dust in a 5 per cent. mixture with precipitated chalk is the best substance against *H. antiqua* and *P. rosae*. Creosote in a 1 per cent. mixture in chalk gave promising results against the latter, but is not considered an efficient remedy against *H. antiqua*; this fly may be treated with a 1 per cent. mixture of chlor-cresylic acid with chalk.

The experiments against *Phorbia brassicae* are only preliminary, and merely indicate possible lines for future trial. The best results were obtained in the field with chlor-cresylic acid, green tar oil and creosote; fairly good results were also obtained with anthracene oil and nicotine sulphate. Tests were also made in order to ascertain the value of mercury bichloride against *P. brassicae*. The results of these experiments, though also not conclusive, do not justify the use of this substance. In no case were the larvae at the roots of the plants killed or oviposition prevented.

Observations on *Ceuthorrhynchus pleurostigma*, Marsh., show that the galls produced by this weevil are attractive to slugs and that the health of the plant in the seedling stage is impaired; if given good cultural conditions, however, at the time of planting out, cabbages will flourish normally in spite of them.

CAMERON (W. P. L.). **The Fern Mite** (*Tarsonemus tepidariorum*, **Warburton**).—*Ann. App. Biol.*, xii, no. 1, pp. 93–112, 10 figs. Cambridge, February 1925.

Serious injury to the valuable greenhouse fern, *Asplenium bulbiferum*, in Kent has been found to be due to *Tarsonemus tepidariorum*, Warb. There appear to be no other records of this mite in Europe or America, though in England it has been present for some years and has recently become more serious in some districts, particularly near London. The systematic position of the mite is discussed, and the various stages are described. So far as is known, this fern is its only food-plant. The mites are found in the innermost recesses of the unopened fronds and pinnae, on the incurled upper-side of the young fronds, among the scale leaves and scales at the base of the plant, and on the young plants situated on the old fronds. They show a preference for any hollows or grooves, but are not found on the older leaves. The eggs are laid singly or in groups of from 2 to 5; they are always in moist places and never exposed on the plant. They hatch in 2 to 4 days, according to the temperature. The larvae crawl about the plant, puncture the cells and suck up their liquid contents. The length of this stage varies from 7 to 14 days, and is followed by a quiescent period, which is much shorter. In this stage the eight-legged adult is formed inside the six-legged larval skin. It is possible that pairing occurs when the female is in this stage. The adults are found on the plants in greenhouses all the year round, being most numerous between May and July. There are many generations a year, which overlap completely, the entire life-cycle from egg to egg taking from 11 to

23 days. Parthenogenesis may occur during the winter and very early spring. As a result of the feeding on the plant small depressions are formed, which later turn brown, the plants eventually becoming unsaleable.

In the nursery the mites are spread from one plant to another by crawling from leaf to leaf where these touch, and probably by walking along the surface of moist earth, as well as by the planting of young plants taken from infested parents. Badly infested plants should be burnt and the soil in the houses sterilised. It is advisable to treat the young plants with some insecticide before planting, and they should be kept free from pests by deterrent sprays.

A list is given of 33 other species of *Tarsonemus* with references to the literature.

WARE (W. M.). **A Disease of Wild White Clover caused by the Eelworm, *Tylenchus dipsaci* (Kühn), Bastian.**—*Ann. App. Biol.*, xii, no. 1, pp. 113–119, 3 figs. Cambridge, February 1925.

White clover (*Trifolium repens*) is of considerable economic importance in grassland for grazing, and as a seed crop in old permanent pasture or on arable land. *Tylenchus dipsaci*, Kühn, causes considerable damage to this crop in England. The appearance of the attacked plants is described. Some are killed outright, and others may last 6 to 12 months before dying. The infestation is partly responsible for the lack of permanence sometimes ascribed to strains of white clover. Tests of the susceptibility of various clovers show that red clover is remarkably resistant. In view of the possibility of the existence of biological strains of Nematodes preferring the plant that they have infested for several generations, it is suggested that in tests of the relative susceptibility of various plants to attack by *T. dipsaci* the previous food-plants should be taken into consideration.

PARKER (T.). **The Dormant Spraying of Fruit Trees.**—*The Fertiliser, Feeding-Stuffs & Farm-Supplies Jl.*, separate, 1 p. [*Sine loco.*] 14th January 1925.

The object of dormant spraying is to destroy insect eggs, the hibernating stages of certain pests, and the winter spores of injurious fungi, and to clean the trees of parasitic growths that afford shelter to various pests and diseases. Coal-tar oils have been largely recommended for this purpose, and they can now be obtained in a soluble form by passing them through a process of emulsification [*cf. R.A.E.*, A, xiii, 92]. These emulsions are less effective against fungi than lime-sulphur, and are more expensive than the latter, even when it is used in conjunction with a calcium caseinate spreader or caustic soda plus nicotine, which will also destroy the insect eggs. Ordinary creosote oil is considered to be a less efficient fungicide than lime-sulphur solution, which is in agreement with practical experience. The effectiveness of the oil emulsion spray depends largely on the manner in which it spreads and wets the trunk and branches when properly applied. This is a characteristic of this class of wash where the active ingredient is present in the colloidal condition. They are at any rate most effective in removing all kinds of moss, lichens and algae, thereby destroying the breeding grounds of insects and pests.

HANCOCK (G. L. R.). **Parasites and Hyperparasites of *Tortrix viridana* L.**—*Ent. Mo. Mag.*, lxi, pp. 26–28. London, February 1925.

Several parasites and hyperparasites have been bred from *Tortrix viridana*, L., in England, but none of them in sufficient numbers for the natural control of this pest on a large scale. The parasites here recorded include *Pimpla maculator*, F., from pupae; *P. rufata*, Gmel., probably from pupae; *Phytodietus segmentator*, Grav., from leaves rolled by *T. viridana*; *Phaeogenes stimulator*, Grav., from pupae; *Meteorus ictericus*, Ruthe, and *Apanteles emarginatus*, Nees, from cocoons in rolled oak leaves; and *Pteromalus deplanatus*, Nees, from pupae. Though usually a direct parasite, *Pimpla maculator* was also bred from a cocoon considered to be that of *Macrocentrus abdominalis*, F. *Hemiteles areator*, Panz., and *Sympiesis sericeicornis*, Nees, have been bred from cocoons (believed to be those of *Apanteles*) found in rolled oak leaves, but it is not certain that the host was *T. viridana*.

Omorga fusciplica, Thoms., bred from larvae, *Eclytus fontinalis*, Holmgr., externally parasitic on the larvae, and *Mesochorus thoracicus*, Grav., bred from pupae, are recorded for the first time from *T. viridana*.

GREEN (E.). **Observations on British Coccidae, ix.**—*Ent. Mo. Mag.*, lxi, pp. 34–44, 5 figs. London, February 1925.

The species dealt with include: *Kuwania pini*, sp. n., on *Pinus sylvestris* in Surrey; *Eriococcus hoheriae*, Mask., on *Hoheria populnea* in the Scilly Isles (this being the first record outside New Zealand); *Pseudococcus* (*Trionymus*) *phalaridis*, sp. n., on *Phalaris arundinacea* in Surrey; *P.* (*T.*) *peregrinus*, sp. n., on roots of *Nerine flexuosa* near Southampton; *Lepidosaphes laterochitinosa*, sp. n., on an orchid (*Coelogyne* sp.) in Surrey; *Phenacoccus interruptus*, Green, differing slightly from the type [*R.A.E.*, A, xi, 529]; *Eulecanium* (*Lecanium*) *persicae*, F., on *Tamarix* (the first record of any Coccid on this plant in Britain); *Aspidiotus britannicus*, Newst., on bay tree (*Laurus nobilis*); and *Lepidosaphes ulmi*, L., abundant on thin wiry stems of *Helianthemum vulgare* and *Erica tetralix*. *Lepidosaphes tuberculata*, Malenotti, is stated to be a synonym of *L. pinnaeformis*, Bch., which appears to be confined to orchids of the genus *Cymbidium*.

ADKIN (R.). *Tortrix pronubana*.—*Entomologist*, lviii, no. 742, p. 60. London, March 1925.

In addition to the food-plants recorded by Fisher [*R.A.E.*, A, xii, 560], the author has reared *Tortrix pronubana*, Hb., from such unlikely plants as *Hypericum calycinum* and *Centranthus ruber*. It was also abundant on *Coronilla glauca* in gardens, the injury being at first mistaken for that of *Depressaria costosa*, Hw.

RAMSBOTTOM (J. K.). **The Control of the Narcissus Eelworm.**—*Gard. Chron.*, lxxvii, no. 1988, pp. 76–77; no 1989, p. 96. London, 31st January & 7th February 1925.

By soaking *Narcissus* bulbs in water at a temperature of 110° to 111° F., for three hours, Nematodes [*Tylenchus dipsaci*] are destroyed without injury to the plant. It is most important that the bulbs should be subjected to the sterilisation process whilst they are in a dormant state, and the treatment should not be begun until the embryo flower bud is easily discernible to the naked eye if the bulb is

cut open. August and September may be regarded as safe months for the operation. Ground once infected with Nematodes may be used again for a *Narcissus* crop after three clear years, provided that, in the intervening period, neither these flowers nor onions occupy the land.

CORBETT (W. O.). **A new Pest of Greenhouses.**—*Gard. Chron.*, lxxvii, no. 1989, p. 96. London, 7th February 1925.

The larvae of *Tortrix pronubana* have done much damage in greenhouses in southern England, especially in the Thames valley near Kew. They attack various plants, but prefer *Acacia*, *Grevillea* and *Dianthus* spp., rolling up the leaves and feeding in them. A few food-plants are given additional to a list in a previous paper [*R.A.E.*, A, xii, 560].

VAN DEN BROEK (M.) & SCHENK (P. J.). **Ziekten en Beschadigingen der Tuinbouwgewassen. Eerste Deel A.** [Diseases and Injuries of Horticultural Plants. Vol. I A.]—xi+360 pp., 176 figs. *Groningen & The Hague*, J. B. Wolters, 1925. Price, *Fl.* 3.50.

The first half of this book deals with injurious animals, and is mainly concerned with insect pests. The Dutch and scientific names of the pests are given, together with such particulars of their life-histories as are of practical interest, and with accounts of methods for controlling them. A list is given of the pests, and another one groups them according to the plants affected. The useful character of this book is indicated by the fact that this is the fourth edition since the original issue in 1915.

REH (L.) & others. **Sorauer: Handbuch der Pflanzenkrankheiten. Bd. iv. Tierische Schädlingen an Nutzpflanzen. Erster Teil.** [Sorauer. Text-book of Plant Diseases. Vol. iv. Animal Pests of Economic Plants. Part 1.]—xvi+483 pp., 218 figs. Berlin, Paul Parey, 1925. Price, *Mks.* 28.

The fourth edition of the section on animal pests (almost exclusively insect pests) of economic plants of Sorauer's text-book represents an advance on the third edition (1913), not merely in a substantial increase in matter—483 pages for the present first part of the section as against 774 pages for the whole in the previous edition—but in the importance assigned to the various subjects, which are here treated in a more uniform manner, an improvement which it is hoped to expand in future issues. The Arthropods dealt with in this first part include Myriapoda, Arachnoidea, Apterygota, Orthoptera, Copeognatha, Corrodentia, Thysanoptera, Trichoptera and Lepidoptera. In spite of many obstacles, including the difficulty of access to non-German literature, this new edition brings Sorauer's classic work well abreast of modern developments.

RUSCHKA (F.). **Kleine Beiträge zur Kenntnis der forstlichen Chalcididen und Proctotrupiden von Schweden.** [Minor Contributions to the Knowledge of the Forest Chalcids and Proctotrupids of Sweden.]—*Ent. Tidskr.*, xlv, no. 1, pp. 6–16, 14 figs. Stockholm, 1924. [Received 20th February 1925.]

These notes are the results of a study of a series of bred Swedish Chalcids and Proctotrupids from the collection of the Swedish Forestry Experimental Institute.

The Chalcids include *Eurytoma auricoma*, Mayr, from *Ips typographus*, L.; *Copidosoma geniculatum*, Dalm., from *Rhyacionia* (*Evetria*) *buoliana*, Schiff., of which it is the normal parasite; *Ipocoelius seitneri*, gen. et sp. n., from *Ips typographus*, and the larva of which is itself parasitised by *Eutelus typographi*, sp. n.; *I. rotundiventris*, sp. n., described from a female bred from *Rhynchaenus* (*Orchestes*) *fagi*, L., in Austria; *Rhopalicus suspensus*, Ratz., from *I. typographus*; *Habrocytus radialis*, Thomson, from *Anthonomus varians*, Payk.; *Trichomalus diachymatis*, Ratz., from *Rhynchaenus* (*Orchestes*) *testaceus*, Müll.; *Rhoptrocerus xylophagorum*, Ratz., from *I. typographus*; *Cirrospilus pictus*, Nees, from *Coleophora laricella*, Hb.; *Microplectron fuscipenne*, Zett., from *Diprion* (*Lophyrus*) *pini*, L.; *Eulophus pectinicornis*, L., *E. longulus*, Zett., *Chrysocharis boops*, Thoms., and *Tetrastichus cyclogaster*, Ratz., from *Rhynchaenus fagi*; *T. cyclogaster* var. *obscurata*, n., from *R. testaceus*; *T. euonymella*, Bé., from *Hyponomeuta padellus*, L.; *T. pospielovi*, Kurdj., from *R. testaceus* and *Anthonomus varians*; and *Trichogramma evanescens*, Wlk., from the eggs of *Arctia caja*, L.

The Proctotrupids, all of which were obtained from the eggs of the host, were *Prophanurus bombycis*, Meyr., from *Macrothylacia rubi*, L.; *P. dalmani*, Ratz., from *Notolophus* (*Orgyia*) *antiquus*, L.; and *P. phalaenarum*, Nees, from Noctuid eggs on *Sorbus aucuparia*.

Bengtsson (S.). **Braconologische Notizen.** [Braconid Notes.]—*Ent. Tidskr.*, xlv, no. 1, pp. 35–38. Stockholm, 1924.

Service berries are believed to play a considerable part in the development of the apple pest, *Argyresthia conjugella*, Zell. Two Braconids, *Bracon pulcher*, sp. n., and *B. conjugellae*, sp. n., have been bred from these berries, and are thought to be important parasites of the moth.

Raymond (G.). **Sur un singulier parasite d'une Cochenille de l'oranger, le** *Pulvinaria floccifera*.—*Ann. Soc. linn. Lyon*, N.S., lxix (1922), pp. 117–118, 1 fig. Lyons, 1923.

The larva of a Chalcid parasite found in *Pulvinaria floccifera* is described.

Gautier (C.), Bonnamour (S.) & Chifflot (J.). **Observations biologiques sur** *Tingis pyri* F., **le Tigre du Poirier.**—*Ann. Soc. linn. Lyon*, N.S., lxix (1922), pp. 160–166. Lyons, 1923.

Stephanitis (*Tingis*) *pyri*, F., is fairly generally distributed throughout Europe, particularly in the South, and has also been recorded from Turkestan. It not only attacks pear and apple, but also peach, apricot, cherry, walnut, quince and rose. The eggs are found from the end of May on the lower surface of the leaves. The larvae appear seventeen days after oviposition, and at once begin to suck the juice from the leaves. They have five moults, and there are at least four generations a year, a certain number of adults hibernating.

Raymond (G.). **Contribution à l'étude des Thrips attaquant les oeillets.**—*Ann. Soc. linn. Lyon*, N.S., lxx (1923), pp. 160–171, 1 pl. Lyons, 1924.

Physopus pallipennis, Uzel, and *Thrips communis*, Uzel, are typical of the many species of thrips that attack carnations and other plants,

such as wallflowers and marigolds, in the neighbourhood of Antibes. The males are only to be found in the spring and at the end of summer, and then only in very small numbers; during the warm months only egg-bearing females are to be seen. The eggs are deposited inside the young leaf buds on which the larvae feed. In addition to the direct harm done, the wounds caused by the insect become foci of infection for rust (*Uredo*) which is always abundant where thrips flourish.

The best remedy is a nicotine and soap solution. All wild flowers near greenhouses should be destroyed in winter, and, at the end of the season, all carnation plants left in the ground should be dug up and burned [*cf. R.A.E.*, A, xii, 253].

SCHWARTZ (—). **Ueber die Ausbreitung und Bekämpfung des Kartoffelkäfers in Frankreich.** [The Distribution and Control of the Potato Beetle in France.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 3, pp. 18–21, 1 map. Berlin, 1st March 1925.

This article is a compilation based on the various French publications on the occurrence and control of the Colorado potato beetle [*Leptinotarsa decemlineata*] in France.

DE JONG (W. H.). **De bestrijding der emelten.** [Measures against Tipulid Larvae.]—*Tijdschr. Plantenziekten*, xxxi, no. 2, pp. 56–58. Wageningen, February 1925.

This is an account of the method described by Packard and Thompson of using a poison-bait containing Paris green against larvae of *Tipula* spp. [*R.A.E.*, A, ix, 576]. This measure is now employed in Holland with good results.

Jahresheft 1922 des Phänologischen Reichsdienstes. [Report for 1922 of the Imperial Phenological Service.]—*Mitt. Biol. Reichsanst. Land- u. Forstw.*, no. 25, 222 pp. Berlin, December 1924 [Received 9th March 1925.]

This report contains a series of tables showing for 1922 the seasonal development of plants and of the fungi and insect pests connected with them, as observed by the stations of the German phenological service.

SCHNEIDER-ORELLI (O.). **Ueber die Reblausrassenfrage.** [On the Question of Races of *Phylloxera*.]—*Deutscher Weinbau*, [*sine loco*] 1925. Separate, 2 pp.

After discussing Börner's views and his own [*R.A.E.*, A, xii, 556] on the subject of various races of *Phylloxera*, the author describes the practical measures adopted in eastern Switzerland in the matter of vine-stocks. In all infested districts where immune stocks are suitable from the economic point of view, they should be used exclusively. In other localities where American stocks suitable economically, but not absolutely immune from *Phylloxera*, produce better crops, they are to be chosen, especially as experience hitherto has shown that while infestation of their roots occurs when they are

grown in pots, no infestation has been observed in field vines in eastern Switzerland, though root infestation occurs in the Mediterranean region.

Borcea (J.). **Dégâts causés par les Bostrychidés en Roumanie.**—*Ann. Sci. Univ. Jassy*, xii, pp. 221–260. 1924. (Abstract in *Centralbl. Bakt. Parasit. Infekt.*, IIte Abt., lxiii, no. 23–25, p. 534. Jena, 20th February 1925.)

The forests of Rumania extend over about 18 million acres, of which about one-quarter are covered with conifers. In December 1915 violent storms caused much destruction, and measures against bark-beetles were not undertaken immediately.

The chief injury was done to *Picea excelsa*, *Ips typographus*, L., and *Pityogenes chalcographus*, L., being the species concerned. *Pityokteines curvidens*, Germ., and *Cryphalus piceae*, Ratz., were specially injurious to *Abies alba*, and *Myelophilus* (*Blastophagus*) *minor*, Hart., attacked *Pinus sylvestris*. Other beetles observed were *Xylechinus pilosus*, Ratz., *Myelophilus* (*Blastophagus*) *piniperda*, L., *Polygraphus poligraphus*, L., *Crypturgus pusillus*, Gyll., *Cryphalus abietis*, Ratz., *Xyloterus lineatus*, Ol., *Pityophthorus micrographus*, L., and *Ips amitinus*, Eichh. A brief mention is made of beetles predacious on them, *viz.*, *Thanasimus formicarius*, L., *Rhizophagus ferrugineus*, Payk., and *Nemosoma elongatum*, L. A list of references to the Rumanian literature on bark-beetles is given.

Paoli (G.). **Due Rincoti dannosi alla vite.** [Two Bugs injurious to the Vine.]—*Rend. Unione zool. ital. Genova, 1923* [*Monit. zool. ital.*, xxxv, no. 11], 14th Meeting, pp. 54–56. Naples [1924].

This paper is substantially the same as one already noticed [*R.A.E.*, A, xii, 451].

Simmel (R.). **Zur Lebensweise des** *Leperisinus orni* **Fuchs im Vergleiche mit** *Leperisinus fraxini* **Panz.** [On the Life-history of *Hylesinus* (*L.*) *orni* compared with *H.* (*L.*) *fraxini*.]—*Ent. Blätter*, xx, no. 4, pp. 225–228. Berlin, 31st December 1924.

In Julian Venetia the flight-period of the Scolytid, *Hylesinus* (*Leperisinus*) *orni*, Fuchs, occurs earlier in the year than that of *H.* (*L.*) *fraxini*, Panz. This is due to the fact that the former hibernates in the adult stage, and the latter in the larval. The larva of *H. orni* pupates in the wood, while that of *H. fraxini* does so in the bark. *H. fraxini* usually breeds in the lower parts of the ash, and *H. orni* in the upper ones.

Passerini (N.). **Influenza della qualità degli alimenti sull' accrescimento delle larve e sul metabolismo del** *Tenebrio molitor* **L.** [The Influence of the Quality of Foods on the Growth of the Larvae and on the Metabolism of *T. molitor*.]—*Atti R. Accad. naz. Lincei*, Ser. 6, Rend. Classe Sci. fis. mat. e nat., i, no. 1, pp. 58–59. Rome, 1925.

This paper gives the conclusions reached in experiments of which a full report is to be published. The flour of wheat deprived of its bran has been found to lack some principle needful for the complete development of the larva of *Tenebrio molitor*, L.

Locusts in Italian Somaliland. (Communicated by the Italian Colonial Ministry to the International Institute of Agriculture.)—*Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 4, pp. 1000–1001. Rome, October-December 1924. [Received 14th February 1925.]

The information regarding locusts in Italian Somaliland is very inadequate. For about 10 years no flights have been seen there. The last two invasions, in 1905 and 1912-13, destroyed the native crops. The natives believe that the swarms come from a long distance, mostly from Abyssinia, although a small proportion come from India or Uganda, and that they only exceptionally breed in Somaliland, as they are known to have done, in 1913, on the dunes of Merca.

La labor efectuada para el Consejo Provincial de Fomento de Tarragona contra la mosca olearia in 1923, con la cooperación de los técnicos. [The Work done against the Olive Fly in 1923 with the Aid of Experts by the Provincial Council of Agriculture of Tarragona.]—*Bol. mens. olivic. y elaboración moderna de aceite de oliva*, no. 67, pp. 444–445. Tortosa, 1924. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 4, p. 1002. Rome, October-December 1924.) [Received 14th February 1925.]

The part of the work concerned with the introduction of the Braconid, *Opius concolor*, Szépl., has been noticed already [*R.A.E.*, A, xii, 61 ; xiii, 56]. A search for other parasites of the olive fly, *Dacus oleae*, Rossi, in addition to *Eupelmus urozonus*, Dalm., led to the discovery in 1923 of another Chalcid, *Eulophus longulus*, Zett., obtained in large numbers in olives from various parts of the Province, except Tarragona. From the latter locality *E. urozonus* only was obtained. Negative results have hitherto attended experiments with two other European Chalcids, *Eurytoma rosae*, Nees, and *Dinarmus dacicida*, Masi. At Campredó another Trypetid, *Myopites limbardae*, Schin., which is often parasitised by *E. rosae* and *E. urozonus*, was discovered on the Composite, *Inula viscosa*, but only the latter was obtained from it.

Isaakides (C. A.). **Note on the Measures taken for Control of the Olive Fly** (*Dacus oleae*) **in Greece during 1921.**—*Internat. Rev. Sci. & Pract. Agric.*, N.S. ii, no. 4, pp. 1002–1010. Rome, October-December 1924. [Received 14th February 1925.]

The information given here is mainly concerned with the work done in Corfu which has been noticed from another source [*R.A.E.*, A, xii, 190]. Similar measures were adopted by the communes in the island of Leucadia and by the municipality of Prevesa on the mainland.

Wilkinson (D. S.). **Entomological Notes.**—*Cyprus Agric. Jl.*, xx, pt. 1, pp. 9–10. Nicosia, January 1925.

The following insect pests have been recorded during the last 18 months in Cyprus :—

Coleoptera. *Silvanus surinamensis*, L., from compressed preserved figs ; *Trogoderma versicolor*, Creutz., occurring in stored wheat throughout the Island, and doing very considerable damage ; *Lasioderma serricorne*, F., found in tobacco in warehouses ; *Bruchus dentipes*,

Bdi., from broad beans; *Aulacophora foveicollis*, Kust., apparently a very general feeder; *Sibinia planiuscula*, Desbr., from cotton; *Anthonomus pomorum*, L., taken during hibernation on pear; *Pachytychius hordei*, Brullé, taken from inside the sheaves of wheat; *Phloeotribus caucasicus*, Reitt., a twig-borer of the olive, causing much damage, but apparently very local; *Scolytus amygdali*, Guér., from plum; and *Adoretus pullus*, Bdi., from pear.

Rhynchota. *Graphosoma semipunctatum*, L.; *Oxycarenus hyalinipennis*, Costa, from cotton bolls; *Stephanitis pyri*, F., on apple and pear all over the Island, sometimes causing considerable defoliation; *Aphis gossypii*, Glov., very prevalent on cotton; *Pterochlorus persicae*, Cholod., from the stems of almond and plum trees; an Aphid, thought to be *Eriosoma lanigerum*, Hausm., which appears to have been introduced from England on apple stock, found in one isolated orchard; *Chrysomphalus* (*Aonidiella*) *aurantii*, Mask., chiefly attacking lemons, and sometimes causing complete defoliation and loss of fruit; and *Aspidiotus hederae*, Vall., occurring throughout the Island on wattle [*Acacia*], though there are no authentic records of its occurrence on *Citrus*.

Lepidoptera. *Earias insulana*, Boisd., and *Platyedra gossypiella*, Saund., taken from all over the Island and a serious danger to cotton in Cyprus; *Laphygma exigua*, Hb., a serious pest of potato crops, which is parasitised by the Tachinid, *Sturmia bimaculata*, Hartig; *Thaumetopoea wilkinsoni*, Tams, a major pest of the pine throughout the Island, the eggs of which are parasitised by *Ooencyrtus* (*Schedius*) *pityocampae*, Mercet, and another unidentified Chalcid, and the larvae by a Tachinid and an Ichneumonid, of which the former is itself parasitised by the Chalcid, *Dibrachys boucheanus*, Ratz.; *Myelois ceratoniae*, Zell., a pest of carob beans [*Ceratonia siliqua*], and apparently on the increase; and *Phthorimaea operculella*, Zell. (*Lita solanella*, Boisd.) occurring abundantly in all the potato-growing districts of the plains.

Diptera. *Ceratitis capitata*, Wied., is recorded from oranges, tangerines, figs and apricots all over the Island, causing great damage; and *Gitona beckeri*, Duda, and *Drosophila melanogaster*, Mg., from figs.

Hymenoptera. *Eurytoma amygdali*, Endl., a major pest of almonds.

Zanon (V.). **Contributo alla conoscenza della fauna entomologica della Cirenaica. Ortotteri di Bengasi.** [Contribution to the entomological Fauna of Cirenaica. Orthoptera of Bengasi.]—*Mem. Pont. Accad. Sci. Nuovi Lincei*, vii, Separate, 23 pp. Rome, 1924.

A list of the Orthoptera found at Bengasi is given with an account of the serious invasions of *Tettigonia albifrons* in 1918. In one case [*R.A.E.*, A, viii, 200] the wasp, *Sphex flavipennis*, destroyed the locust in large numbers.

Balachowsky (A.). **Les maladies du dattier dans le Sud Oranais.**—*Rev. agric. Afr. Nord*, xxiii, no. 290, pp. 117–123, 5 figs. Algiers, 20th February 1925.

Parlatoria blanchardi is a serious pest of the date palm at Colomb-Bechar (Algeria), though in other localities it is of minor importance. The possible existence of parasites in such localities should be investigated with a view to their introduction into the more severely

infested area. The only satisfactory remedial measure against this scale is burning [*cf. R.A.E.*, A, i, 218, 518]. It is suggested that lime-sulphur sprays might also prove effective.

The author does not consider the presence of *Phyllognathus silenus* and *Pentodon bispinosus* in palms suffering from the "Doud" disease to be sufficient proof of any relation between these beetles and the disease, and further states that they are incapable of producing the injury ascribed to then [*cf. R.A.E.*, A, x, 288; xi, 155].

CÉARD (L.) & RAYNAUD (R.). **Sur les dégâts causés par la cochenille du dattier dans la palmeraie de Colomb-Bechar.**—*Bull. Soc. Hist. nat. Afr. Nord*, xvi, no. 1, pp. 43–44. Algiers, January 1925.

The importance of the continued attack of *Parlatoria blanchardi* on date palms is considerable. Unless remedial measures are systematically adopted, palms successfully cleaned of the scale by burning become reinfested from those not so treated. An order has now been issued by the Governor General of Algeria for the immediate investigation of the subject with a view to recommendations for control.

SMEE (C.). **Entomology.**—*Nyasaland: Ann. Rept. Dept. Agric. 1923*, pp. 35–38. Zomba, 1924. [Received 16th February 1925.]

During 1922–23 the cotton bollworm [*Heliothis obsoleta*, F.] was particularly abundant. Although the broods overlap and therefore all stages are found in the field at the same time, there is a distinct rise and fall in the visible amount of attack coincident with a rise and fall in the percentage of full-grown larvae found at any specified time. It is more economical to concentrate handpicking campaigns at the beginning of the season to catch the first brood. Trap-crops of maize, various species of *Hibiscus* and chick peas [*Cicer arietinum*] did not have any effect on the attack on cotton by *H. obsoleta*. The removal of the first crop of bolls and buds gave promising results and might replace the early handpicking already mentioned.

Small ants were troublesome in tobacco seedbeds, the damage consisting in the removal of the seed. They may be checked by broadcasting poison bait over the moist seedbed about two days before sowing. Swarms of caterpillars of *Laphygma* (*Caradrina*) *exigua*, Hb., and *Prodenia litura*, F. (*littoralis*, Boisd.) appeared on cotton and tobacco, apparently as a result of neglecting the destruction of a weed that harbours these larvae before the planting of the tobacco. The infestation was checked by trenching and the application of Paris green dust, and in one very severe case by spraying with lead arsenate. Fumigation with liquid hydrocyanic acid, though dangerous, particularly in the hot weather, is infinitely superior to the use of sodium cyanide with sulphuric acid against the tobacco beetle [*Lasioderma serricorne*, F.]; it is also considerably cheaper.

MASON (T. G.) & JONES (G. H.). **A First Survey of Factors inhibiting the Development of the Cotton Plant in Southern Nigeria.**—*Nigeria: 3rd Ann. Bull. Agric. Dept.*, pp. 11–30, 9 figs. Lagos, 1924. [Received 16th February 1925.]

Dysdercus superstitiosus, F., is the most important cotton-stainer in Nigeria and is responsible for the spread of internal boll disease in the same way as other species in the West Indies. The cage experiments

described confirm the results obtained by Pomeroy and Golding [*R.A.E.*, A, xii, 67] and show that American cotton cannot be grown in the presence of large numbers of cotton-stainers. Field observations are also included.

There are at least four species of bollworms, the commonest being *Diparopsis castanea*, Hmps.; the percentage of bolls shed was greater in American than in native cotton, though this was reversed in the case of open bolls.

The following is taken from the authors' summary and conclusions :— The results of the year's work seem to show that American cotton is definitely more susceptible to the attacks of insects than is the native type. Inasmuch as some of these insects introduce fungous and possibly bacterial diseases, the greater susceptibility of the exotic cotton may possess considerable significance. The physiological basis of this difference in immunity is not known. It is possible that the marked variation in the yields of American cotton from year to year may be due to variability in the insect population, and this in turn may be determined by variations in August rainfall. A very suggestive, though far from conclusive, correlation is indicated by an examination of the figures for August rainfall and the yield of cotton in different years, the two tending to vary inversely. Poor yields were also obtained from native cotton grown in proximity to American, which may be partly due to its being attacked by cotton-stainers from the latter.

The Plants Protection Ordinance, No. 18 of 1924. Bathurst, Gambia, 31st December 1924.

This ordinance provides for the regulation of the importation of plants and their disinfection and treatment, the proclamation of infected areas, the notification and eradication of pests or diseases, the payment of compensation and the powers of the Governor to make regulations for preventing the introduction into, or spread in, Gambia of any pest or disease.

VAYSSIÈRE (P.) & MIMEUR (J.). **Les chenilles épineuses du cotonnier (*Earias insulana* Boisd. et *E. biplaga* Walk.) en Afrique occidentale française.**—*Agron. colon.*, no. 85, pp. 6–14, 1 pl. Paris, January 1925.

Earias insulana, Boisd. (spiny cotton bollworm) occurs practically wherever cotton is grown, except in North and South America. It is widely distributed in Africa and is one of the major pests of cotton. It appears to have somewhat decreased in numbers in Egypt since the invasion of that area by *Platyedra* (*Gelechia*) *gossypiella*, Saund. (pink bollworm), but in French West Africa it still remains one of the most serious pests of cotton. Besides cotton, the food-plants include various species of *Hibiscus*, *Malva parviflora*, *Ceratonia siliqua*, *Eriodendron* sp., maize, *Abutilon indicum*, *Althaea rosea*, etc.

The various stages are described. The eggs are laid on all parts of the plant, but chiefly round the flower buds and capsules and at the points of the leaves and bracts. The emerging larvae penetrate into the young branches or buds. The cocoon is found in various positions on the plant. The durations of the egg, larval and pupal stages vary according to the season from 3 to 12, 15 to 28, and 10 to 52 days

respectively. In April in the Sudan a cycle is completed in 32 days. The generations are continuous throughout the year in Egypt. In Senegal and the Sudan *E. insulana* occurs from February to July on bi-annual cotton plants, *H. esculentus*, *H. abelmoschus* and various Malvaceae, particularly those growing in humid situations and at the borders of marshes.

Though no natural enemies have been found in Senegal or the French Sudan, the Braconid, *Rhogas kitcheneri*, Dudg. & Gough, and the Chalcid, *Chalcis brevicornis*, Klug, are recorded from Egypt, and the Braconid, *Microbracon lefroyi*, Ashm., from India. The remedial measures are largely quoted from Ghesquiére [*R.A.E.*, A, xi, 15].

E. biplaga, Wlk., occurs in all African cotton-growing districts and apparently only on cotton. It is very similar to *E. insulana* in its life-history, and the same remedial measures may be applied.

Hood (J. D.). **Four New Thysanoptera from Africa.**—*Proc. Ent. Soc. Wash.*, xxvii, no. 1, pp. 8–12. Washington, D.C., January 1925.

The species described include *Astrothrips pentatoma*, sp. n., from a flower of *Phaseolus lunatus*, and *Liothrips genualis*, sp. n., on *Bougainvillea glabra*, both from Nigeria.

Aldrich (J. M.). **A New Tachinid Parasite of a Cocoanut Moth in South Asia (Diptera).**—*Proc. Ent. Soc. Wash.*, xxvii, no. 1, p. 13. Washington, D.C., January 1925.

Ptychomyia remota, sp. n., is apparently of considerable importance, as it has been reared in large numbers from the larvae of *Brachartona* (*Artona*) *catoxantha*, Hmps., causing serious injury to coconuts in the Federated Malay States.

Jepson (F. P.). **Report of the Acting Entomologist.**—*Ceylon Administ. Repts., Dept. Agric. 1923*, pp. D19–D21. [Colombo, 1924.] [Received 2nd March 1925.]

The chief insect pests of tea recorded during the year were the termites, *Calotermes militaris*, *C. dilatatus*, *Termes obscuriceps* and *T. redemanni*. Investigations for the control of *Xyleborus fornicatus* are being continued. Considerable damage is caused by *Homona coffearia*, other tea pests being *Piesmopoda rufimarginella*, a Pyralid that is locally abundant; *Natada nararia*, which was controlled by a "wilt" disease; *Thosea cana*; *Nygmia flava*, recorded for the first time on tea; *Heterusia cingala*; the Coccids, *Coccus viridis* and *Saissetia hemisphaerica*; the mites, *Tetranychus bioculatus*, *Tarsonemus translucens* and *Eriophyes* (*Phytoptus*) *carinatus*; and *Heterodera radicicola*. Fresh outbreaks of *Nephantis serinopa* on coconuts occurred as a result of untreated neighbouring estates, and a co-operative campaign against this pest is advised. Other pests of coconut are *Oryctes rhinoceros*, *Diocalandra frumenti*, *Acanthopsyche cana*, *A. hypoleuca*, *Elymnias fraterna*, *Narosa conspersa* and *Aularches miliaris*.

Several outbreaks of *Spodoptera mauritia* (paddy swarming caterpillar) occurred, serious injury being also caused by it to coconuts. Other rice pests are *Liogryllus bimaculatus*, *Marasmia bilinealis*, *Oides affinis* and *Leptocorisa varicornis*. *Cosmophila erosa* occurred on cotton in the southern Province during November, *Earias* sp. being reported

from the same district; other cotton pests are *Sylepta derogata* and *Dysdercus cingulatus*. Pests of cacao are *Arbela quadrinotata, Dichocrocis punctiferalis, Euproctis* sp., and *Helopeltis antonii*. Insects attacking green-manure trees are *Ceroplastodes cajani, Etiella zinckenella* and *Araecerus fasciculatus* on *Tephrosia candida; Cyclopelta siccifolia* and *Terastia meticulosalis* on dadap (*Erythrina lithosperma*); *Thosea cana* and Psychids on *Albizzia* sp.; and *Pseudococcus virgatus* on *Gliricidia maculata* and *Leucaena glauca*. Other pests are *Dacus ferrugineus* and *Papilio polytes* on *Citrus; Cosmopolites sordidus* and *Odoiporus longicollis* on bananas; *Phthorimaea heliopa* on tobacco; *Coccus viridis, Zeuzera coffeae* and *Xyleborus compactus* on coffee; and *Pachyzancla phoeopteralis*, causing considerable damage to pasture and grass lawns. Investigations into the habits of *Lamprophorus tenebrosus* as an enemy of the snail, *Achatina fulica*, have been continued.

Anstead (R. D.). **Entomology.**—*Rept. Operations Dept. Agric. Madras 1923–24*, p. 16. Madras, 1924.

The pests recorded include *Spodoptera mauritia*, which badly damaged ragi [*Eleusine coracana*] and rice; *Hieroglyphus banian*, which attacked sugar-cane in one locality; and *Calocoris*, which severely damaged Chitrai cholam [*Sorghum*]. The dry conditions were unfavourable to *Schoenobius* (*Siga*) *incertellus*. In an investigation into fruit moths, the chief food-plants were found to be common weeds, and if these are eradicated, the attack on the fruit is greatly diminished.

Crawford (D. L.). **New Indian Psyllidae (with a List of the Species recorded from India and Ceylon by T. V. Ramakrishna Ayyar).**—*Rec. Indian Mus.*, xxvi, pt. 6, pp. 615–625. Calcutta, November 1924. [Received 7th March 1925.]

The new species described are *Diaphorina cardiae* from *Cardia cordata; D. truncata* from shoots of *Nux vomica; Arytaina ramakrishni* in leaves of *Chloroxylon swietenia;* and *Dynopsylla grandis* in galls on *Ficus nervosa*.

Jarvis (E.). **Work of the Division of Entomology.**—*24th Ann. Rept. Queensland Bur. Sugar Expt. Sta.*, pp. 13–18. Brisbane, 1924. [Received 16th February 1925.]

The bulk of this information has been noticed from the author's monthly reports. The Scoliid parasites of cane-grubs recorded include *Campsomeris ferruginea*, F.; *C. carinifrons*, Turner; *Scolia formosa*, Guér., parasitic on larvae of *Lepidoderma albohirtum*, Waterh.; *S. verticalis*, F.; *Discolia soror*, Sm., attacking grubs in sandy soils, such as *Dasygnathus* and *Anoplognathus;* and *Tiphia intrudens*, Sm.

During the course of breeding experiments with *Ceromasia sphenophori*, Vill., the parasite of *Rhabdocnemis obscura*, Boisd., improved methods of handling and tending these flies during captivity were evolved.

A moth-borer occurring at Banna during October has since been identified as the Gelechiid, *Ephysteris chersaea*, Meyr., which may be an introduced species, as examples of it have also been received by the Imperial Bureau of Entomology from Natal.

GURNEY (W. B.). **Mite of Genus *Eriophyes* associated with Malformation of Leaves of *Eucalyptus stricta*.**—*Proc. Linn. Soc. N.S.W.*, xlix, pt. 3, pp. 395–306, 1 fig. Sydney, 24th October 1924.

Eriophyes eucalypti, sp. n., is described from New South Wales as producing a red coloration on the leaves and twigs of *Eucalyptus stricta*.

COTTRELL-DORMER (W.). **Cane Diseases and Pests.**—*Queensland Agric. Jl.*, xxiii, pt. 1, pp. 66–68. Brisbane, January 1925.

Larvae of the grey-back beetle [*Lepidoderma albohirtum*] have only been responsible for minor damage in the districts visited, probably owing to the unusually hard and dry condition of the soil that prevailed at the time the beetles were last on the wing. Larvae of *Lepidiota frenchi* were doing rather serious damage in one locality. This beetle has a two-years' life-cycle. During the winter of its first year in the soil, it hibernates at a depth usually beyond that attained by the average plough, so that, although a field may have been well tilled, cane planted in June or July is liable to attack when the grubs rise close to the surface in September to complete their feeding before going down again the following autumn to pupate. It does not destroy large areas of cane, but confines its activities to patches seldom exceeding one acre.

Gonocephalum torridum, *Monocrepidius* sp. and *Pentodon australis* were found attacking sets and young plants. The first-named is sometimes very destructive in low-lying lands, especially where soil tillage has been neglected during the few weeks preceding planting, as the beetle then lays its eggs profusely among the roots of succulent weeds, and the young larva being deprived of its natural food when the field is planted attacks the eyes of the sets and prevents germination. *Monocrepidius* has been unusually destructive, and dusting the plants with slaked lime immediately before planting has been found of value; if the plants are soaked in water overnight before dusting, germination is improved and the plant has a better chance of forming roots before being attacked. *P. australis* has only caused minor injury.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiii, pt. 1, pp. 68–69. Brisbane, January 1925.

In connection with the breeding of Tachinid parasites, a Cerambycid, *Prosoplus misellus*, Pasc., has been found tunnelling canes infested with grubs of *Rhabdocnemis obscura*, Boisd.

The Eumolpid, *Rhyparida morosa*, Jac., first recorded as a cane pest in 1915 [*R.A.E.*, A, iv, 345], has been found in three widely separated districts in a period of less than a month. It is not likely to become a serious cane pest, but headlands should be kept free from coarse grass, otherwise the beetles will tend to encroach on adjoining rows of cane.

Control of Orchard and Garden Pests and Diseases.—*N.Z. Jl. Agric.*, xxx, no. 1, pp. 44–49, 1 fig., 1 table. Wellington, 20th January 1925.

Instructions are given for the preparation of sprays suitable for use against the various types of insects and fungi that attack fruit trees in New Zealand.

Legislation affecting Agricultural, Pastoral and other Industries.—*Fiji Dept. Agric., Ann. Rept. 1923,* p. 1. Suva, 11th November 1924.

Under the Diseases of Plants Ordinance, 1913, the coconut leaf moth, *Levuana iridescens,* is declared a disease and the areas in which it occurs are defined, and proclamations prohibit the importation of plants and plant matter into Fiji from New Guinea and the Bismarck Archipelago.

Simmonds (H. W.). **Report by the Acting Entomologist for the Year 1923.**—*Fiji Dept. Agric., Ann. Rept. 1923,* p. 8. Suva, 11th November 1924.

Pests recorded on coconuts from New Guinea, Bismarcks, Solomons and New Hebrides during 1923 that have not been previously noticed [*R.A.E.,* A, xii, 298–300] include a Locustid, *Habetia defoliata,* Uv., in New Britain; the larvae of the moths, *Agonoxena pyrogramma,* Meyr., *Hectaema indicatrix,* Meyr., *Decadarchis euophthalma,* Meyr., and *Batrachedra arenosella,* Wlk. (a borer into the spathes) in the Solomons.

Beneficial insects included the Pentatomid bug, *Amyotea* sp., which was doing good work against the Hispid, *Promecotheca antiqua,* Weise, in New Britain, and an apparently new Tachinid, a Chalcid and an Ichneumonid, which were parasitic on *Coreus palmarum,* Moore, in the Solomons. *Levuana iridescens,* Beth. Bak. (coconut leaf moth) was found during the year to have spread to the islands of Ovalau and Leleuvia.

Many of the Fijian pests have previously been dealt with [*R.A.E.,* A, xii, 567]. Garden plants (Cycads) were badly damaged at Suva by larvae of the moth, *Cryptoblabes plagioleuca,* Turn., which draws two leaflets together and feeds between them. A parasite (*Elasmus* sp. ?) was bred from them. Silver beet was completely destroyed by the larvae of the moth, *Hymenia fascialis,* Cram. Tobacco in the Bua province was infested with the stem borer, *Phthorimaea* (*Gnorimoschema*) *heliopa,* Low., well known as a pest in India and elsewhere. In the Government rice mill much damage was caused to cotton seed, linseed, cacao beans and chocolate, as well as rice, by the moth, *Corcyra cephalonica,* St. Beetles present were *Calandra oryzae,* L., *Tribolium castaneum,* Hbst. (*ferrugineum,* F.), *Alphitobius diaperinus,* Pz., *Rhizopertha dominica,* F., and *Silvanus surinamensis,* L.

Fullaway (D. T.). **Annual Report for Calendar Year 1923.**—*Hawaiian Forester & Agric.,* xxi, no. 4, pp. 179–181. Honolulu, October-December 1924.

Of the various army-worm parasites introduced into Hawaii, the Chalcid, *Euplectrus* sp., has been successfully reared in captivity and liberated in the different Islands. This species will propagate at higher elevations than Honolulu, though development is slower. *Calosoma* spp. have also been liberated, and it is hoped that these predacious beetles will become established. Other beneficial insects liberated during the year are *Galesus silvestrii* 600, *Dirhinus giffardi* 200, *Diachasma tryoni* 2,180, *D. fullawayi* 100, *Opius humilis* 100, and

Tetrastichus giffardianus 8,700, all parasites of the fruitfly [*Ceratitis capitata*]; *Opius fletcheri* 6,965, a parasite of the melon fly [*Dacus cucurbitae*]; and *Paranagrus osborni* 4,150, a parasite of the maize leafhopper [*Peregrinus maidis*].

EHRHORN (E. M.). **Reports of Chief Plant Inspector for September-November 1924.**—*Hawaiian Forester & Agric.*, xxi, no. 4, pp. 181–187. Honolulu, October-December 1924.

The pests intercepted include: From China, *Pseudococcus* sp. on sweet potatoes, *Pheidole* sp. in baskets of water chestnuts and a Mantid egg-mass on bamboo brooms; from Japan, *Bruchus chinensis* in beans, weevil and Lepidopterous larvae in acorns, and Lepidopterous larvae in chestnuts; from the United States, *Lepidosaphes ulmi*, and a mealybug on pears from Washington, and *Pseudococcus maritimus* on pears, another mealybug on fechium bulbs and weevil larvae in acorns from California.

EHRHORN (E. M.). **Annual Report for Calendar Year 1923.**—*Hawaiian Forester & Agric.*, xxi, no. 4, pp. 187–189. Honolulu, October-December 1924.

This is a record of the work of the plant inspection division during 1923, most of which has been previously noticed in the monthly reports.

HOUGH (W. S.). **The Anal Lobe of** *Pseudococcus comstocki* **Kuw. (Homop.: Coccidae).**—*Ent. News*, xxxvi, no. 2, pp. 52–54, 7 figs. Philadelphia, Pa., February 1925.

Pseudococcus comstocki, Kuw., has been subject to rather extensive biological investigation in Northern Virginia during the past 2 years, where it has become a pest of the umbrella catalpa (*Catalpa bungei*). In the course of these studies certain variations in the chitinisation of the anal lobe were noticed to be of frequent occurrence. These are described and illustrated.

Crop Pest and Nursery Laws of Georgia and Regulations of State Board of Entomology.—*Georgia State Bd. Entom.*, Bull. 66, 34 pp. Atalanta, Ga., September 1924. [Received 14th January 1925.]

In this Bulletin are included the Crop Pest Law, of which the first two sections were approved in 1916 and the remainder in 1898, the Georgia Nursery Law of 1922 and the Rules and Regulations of various dates from 1906 to 1924. The regulations of 1924, apart from those concerned with the interstate movement of plants, deal with the importation of certain fruits from Mexico on account of *Anastrepha* (*Trypeta*) *ludens*, of fruits, vegetables and plants from Africa, Argentina, Austria, Azores, Bermuda, Brazil, Cape Verde Islands, Europe, Hawaii, Madeira and New Zealand on account of *Ceratitis capitata*, of certain fruits from Mexico, Cuba, South and Central America on account of *Anastrepha fraterculus*, and of trees, plants and vines from all countries where *Aleurocanthus woglumi* is known to occur.

LEACH (J. G.). **The Seed-corn Maggot and Potato Blackleg.**—*Science*, lxi, no. 1570, p. 120. Garrison, N.Y., 30th January 1925.

Evidence recently obtained shows that the seed-corn maggot, *Phorbia cilicrura*, Rond. (*fusciceps*, Zett.) is a common agent of dissemination of potato blackleg in Minnesota. Preliminary experiments also indicate that the infection may be biologically transmitted by the fly. The eggs are laid on the seed tubers before planting, and may be contaminated with pathogenic bacteria when deposited. The larvae have been found in a very large percentage of the tubers under diseased plants, and have never been observed in those of plants not affected with blackleg. They leave the decayed tubers and pupate in the soil before, or shortly after, the symptoms of the disease first appear on the shoots, and this probably explains why they have not been observed more frequently.

This fly attacks a great variety of vegetable crops, and is widely distributed throughout the United States, though its life-history and means of hibernation are imperfectly known. If seed disinfection is to control blackleg, the tubers must be planted immediately after treatment, or stored in a place inaccessible to the flies.

MARCOVITCH (S.). **Promising Plant Insecticides.**—*Science*, lxi, no. 1566, p. 22. Garrison, N.Y., 2nd January 1925.

This is a brief account of the results of experiments that have already been noticed [*R.A.E.*, A, xii, 118].

RUGGLES (A. G.) & PARKER (J. R.). **Kill Grasshoppers with Poisoned Bran Mash.**—*Minnesota Univ. Agric. Extens. Div.*, Circ. 17, 4 pp., 1 fig. St. Paul, Minn., April 1924. [Received 27th February 1925.]

The materials used in making poisoned bran mash for grasshoppers vary somewhat according to local conditions; those best adapted for Minnesota are discussed, the formula recommended being 100 lb. coarse wheat bran (free from shorts), 5 lb. crude white arsenic, 5 lb. salt, 3 oz. amyl acetate (technical grade), 2 U.S. gals. molasses (low grade), and 10 or 12 U.S. gals. water. The preparation and application of the bait are described.

FORBES (W. T. M.). **The Lepidoptera of New York and neighboring States. Primitive Forms, Microlepidoptera, Pyraloids, Bombyces.**—*Cornell Univ. Agric. Expt. Sta.*, Memoir 68, 729 pp., 439 figs. Ithaca, N.Y., June 1923. [Received 27th February 1925.]

This work is intended primarily to facilitate the recognition of the Lepidoptera of the State of New York and to collect so far as possible the known data on their life-histories. Much of the matter is new, including most of the keys, which it is hoped may serve as a basis for future work. An index to the food-plants is given.

HASEMAN (L.). **Nursery and Orchard Insect Pests.**—*Missouri Agric. Expt. Sta.*, Bull. 176, 31 pp., 31 figs. Columbia, Mo., October 1920; reprinted July 1924. [Received 7th March 1925.]

This is a reprint of a bulletin already noticed [*R.A.E.*, A, ix, 239].

Forbes (W. T. M.). **Two Minor Pests from Europe (Lepidoptera, Plutellidae).**—*Jl. N.Y. Ent. Soc.*, xxxii, no. 4, p. 173. New York, N.Y., December 1924.

Ocnerostoma piniariella, Z. (European pine leaf-miner) and *Cerostoma xylostella*, L. (honeysuckle leaf-roller) were caught at light-traps at Ithaca, N.Y., the former species being obviously well established.

Davis (W. T.). *Melanoplus differentialis* (**Thomas**) **a New Grasshopper to the State of New York.**—*Jl. N.Y. Ent. Soc.*, xxxii, no. 4, p. 215. New York, N.Y., December 1924.

Melanoplus differentialis, Thomas, appears to be spreading along the Atlantic coast both to the north and south of Philadelphia; it has now been taken in New York.

Lundie (A. E.). **A biological Study of** *Aphelinus mali* **Hald., a Parasite of the Woolly Apple Aphid,** *Eriosoma lanigerum* **Hausm.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 79, 27 pp., 6 figs. Ithaca, N.Y., August 1924. [Received 11th February 1925.]

There is evidence that the woolly apple aphis, *Eriosoma lanigerum*, Hausm., originated in N. America, and amongst the natural agencies holding it in check in the United States is the Chalcid, *Aphelinus mali*, Hald. This parasite has been recorded from a number of different species of Aphids, a list of which is given, with a discussion of its synonymy.

The detailed study of its bionomics, here described, was carried out in New York State. The most successful method of investigation was the attachment of small boxes to twigs and branches by piercing a hole in each side of the box and threading the twig through. A strip of bark was then torn off and infested with parasite-free Aphids. The cage can be removed from the tree after the hosts are dead without disturbing the parasites. The parasites were fed on honey and water (not mixed). The female also feeds on the Aphid after piercing it with the ovipositor. The process of oviposition is described. The eggs hatch in 3 or 4 days. The total life-cycle varies from 19 to 43 days; when it extends to from 20 to 25 days, the larval stage lasts 10-12. In summer the pupal stage occupied 6-7 days, but in hibernating individuals brought into a heated room it lasted 10-15.

The life-cycle varied by as much as 13 days in individuals reared under the same conditions of temperature and moisture. Of six females under observation, four laid from 100 to 140 eggs. On 4 different occasions as many as 4 eggs were found in a single Aphid, but only one parasite can mature in these cases. When an Aphid is killed by the parasite, a liquid oozes through the body-wall in contact with the twig and hardens, attaching the Aphid firmly. The general hardening of the body-wall due to this liquid prevents other parasites, and probably hyperparasites also, from laying their eggs in the parasitised Aphid.

From 5 parthenogenetic females, 82 adults were obtained. The sex of 46 was determined, and they were all males. The first adults from overwintering material were obtained on 5th May, and the last reared before the cold weather set in reached the adult stage on 12th October. There appeared to be at least six full generations and a partial seventh

during this period. As an individual may live as long as 42 days, there must be a very considerable overlapping of generations. *A. mali* hibernates as a full-grown larva in the hardened body-wall of its host.

The Aphid undoubtedly continues to produce young during the 3 days that the parasite's egg takes to hatch, and probably till the larva is about half-grown. In spite of this, considerable benefit is derived from parasitism, especially in the case of the stem-mothers, which according to Baker are capable of producing as many as 299 young. *A. mali* is the only known internal parasite of *E. lanigerum*, but the Aphid has various other natural enemies. Only one, *Pipiza radicum*, Walsh & Riley, is known definitely to prey upon the root form, and other predators, Syrphids, Coccinellids, etc., are directly or indirectly enemies of *A. mali*, as they devour Aphids in which there are eggs or maturing larvae, or reduce the numbers of available hosts.

Pachyneuron sp. recorded by F. M. Webster and *Asaphes americana*, Gir., are probably hyperparasites. The first adults from 3 lots of overwintering material belonged to the latter species and preceded the emergence of *A. mali* by 4-10 days. It is not a serious enemy of the latter and seems to be quite rare.

A brief account is given of the introduction of *A. mali* into South Africa. The best time to despatch material is in late autumn or early winter [*cf. R.A.E.*, A, xii, 489].

ALDRICH (J. M.). **New Diptera or Two-winged Flies in the United States National Museum.**—*Proc. U.S. Nat. Mus.*, lxvi, art. 18, pp. 1–36, 1 fig. Washington, D.C., 1925.

The species described include *Chlorops kuwanae*, sp. n., from Japan, the larvae boring in rice stems; and *Anastrepha obscura*, sp. n., from Trinidad, reared from larvae in jacana (*Lucuma multiflora*).

As *Eutrixopsis javana*, Towns., has been found to be an important parasite of *Popillia japonica*, Newm. (Japanese beetle) in Japan, a further description of both sexes is given.

NEWELL (W.). **Report of Plant Commissioner for the Biennium ending June 30, 1924.**—*Qtrly. Bull. State Plant Bd. Florida*, ix, no. 2, pp. 59–86. Gainesville, Fla., January 1925.

The work of the previous years [*R.A.E.*, A, xi, 246] has been continued and has included investigations concerning the nature and control of *Aphis pomi*, DeG. (*spiraecola*, Patch) on *Citrus* [*R.A.E.*, A, xii, 405, 586, etc.]. This Aphid has been temporarily controlled by a fungus, *Entomophthora* sp.

NEIFERT (I. E.), COOK (F. C.), ROARK (R. C.), TONKIN (W. H.), BACK (E. A.) & COTTON (R. T.). **Fumigation against Grain Weevils with various Volatile Organic Compounds.**—*U.S. Dept. Agric.*, Dept. Bull. 1313, 40 pp., 17 tables, 1 graph. Washington, D.C., 26th January 1925.

A brief account of the results of these experiments, indicating the value of an ethyl acetate-carbon tetrachloride mixture for the

fumigation of railway cars against grain weevils has already been noticed [*R.A.E.*, A, xiii, 51]. More than 100 compounds were tested, adults of *Calandra* (*Sitophilus*) *oryzae*, L., *C.* (*S.*) *granaria*, L., and *Tribolium confusum*, F., being used in most of the tests and larvae of *Plodia interpunctella*, Hb., in a great many.

The relative toxicity of the different classes of compounds cannot be given, because the low volatility of several of those tested gave only very low vapour concentrations. As a class, hydrocarbons showed the lowest insecticidal efficiency, not one of the eight tested equalling carbon bisulphide in fumigating power. The most effective fumigant in the glass-jar tests was epichlorohydrin, which killed *C. oryzae* at a concentration of 0·09 per cent., equivalent to 0·23 lb. per 1,000 cu. ft. It was, however, an unsatisfactory fumigant in the presence of grain.

There is no constant relationship between the boiling points and the lethal concentrations of the compounds killing 100 per cent. of the rice weevils after exposure for 24 hours.

A much greater concentration of fumigant is required to kill weevils in wheat than to kill those exposed directly to the vapours in glass jars. A still higher concentration is necessary to kill weevils in wheat in box cars. Ethyl formate and ethyl acetate were the only promising fumigants for grain in box cars. The acetate, however, costs only about one-third as much as the formate.

Odoriferous constituents of low volatility from commercial grades of ethyl acetate (both the 85 per cent. and the 99 per cent. grades) are carried through from the fumigated wheat to the flour, and even to the bread baked from it. A pure grade of ethyl acetate, however, leaves practically no odour in the fumigated grain or in the bran or shorts made from the grain, and none in the flour or in the bread baked from the flour.

The insecticidal efficiency of ethyl acetate under practical fumigating conditions is increased by the addition of carbon tetrachloride. In the mixture recommended [*loc. cit.*] both the ethyl acetate and the carbon tetrachloride must be tested to make sure that they are free from odoriferous constituents of low volatility before they are used in grain fumigating.

ESSIG (E. O.). **Economic Notes.**—*Pan-Pacific Ent.*, i, no. 3, pp. 142–143. San Francisco, Cal., January 1925.

An instance is recorded by V. Duran of the complete defoliation by larvae of *Telea polyphemus*, Cram., of large elms in California.

According to E. W. Rust, although snails of the genus *Helix* are often pests in S. Africa, they sometimes feed on the white wax scale, *Ceroplastes destructor*, Newst.

H. H. Keifer describes his observation in Oregon, in the summer of 1924, of the emergence and flight of a Saturniid, *Coloradia pandora*, Blake, which often causes defoliation of the yellow pine [*Pinus ponderosa*]. The life cycle is of two years' duration. The moths oviposit, and the young larvae then go into hibernation. These larvae feed the following year, and when mature pupate in the ground. Emergence occurs in the second year, the moths being on the wing from 20th June to 20th July. There was no evidence as to overlapping broods.

MARLATT (C. L.). **Report [1923-24] of the Federal Horticultural Board.**—*U.S. Dept. Agric.*, 29 pp. Washington, D.C., 1924. [Received 30th January 1925.]

This report covers the more important activities of the Federal Horticultural Board in the enforcement of the Plant Quarantine Act during the year ended 30th June 1924. Many of the details of the work have been noticed from the quarterly Service and Regulatory Announcements.

Extension of European Corn Borer Quarantine. Amendment No. 1 to Regulations Supplemental to Notice of Quarantine No. 43 (Third Revision).—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 12th December 1924.

Regulations Supplemental to Notice of Quarantine no. 43 (3rd Revision) [*R.A.E.*, A, xii, 577] are amended to include new areas of invasions of the European corn borer [*Pyrausta nubilalis*, Hb.], as from 15th December 1924.

Modification of Cotton Regulations. Amendment No. 2 of Rules and Regulations governing the Importation of Cotton and Cotton Wrappings into the United States.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 8th December 1924.

This amendment to the Rules and Regulations for the importation of cotton and cotton wrappings into the United States [*R.A.E.*, A, xi, 259] became effective 15th December 1924, and provides for and regulates the introduction of cotton from certain districts into border districts in the United States, which are under quarantine on account of the pink bollworm [*Platyedra gossypiella*, Saund.].

BARBER (G. W.). U.S. Bur Ent. **The Importance of winter Mortality in the natural Control of the European Corn Borer in New England.**—*Psyche*, xxxi, no. 6, pp. 279–292, 1 map. Boston, Mass., December 1924. [Received 16th February 1925.]

In the course of several years' investigations of the European corn borer, *Pyrausta nubilalis*, Hb., in the New England area to determine the importance of winter mortality as a limiting factor in the spread of this moth, the spread has been found to be greatest along the coast of New England, where the winter temperatures are less severe than farther inland.

Examinations of several food-plants in the spring of 1922 and 1923 showed that the mortality was greatest in pigweed (*Amarantus retroflexus*) and barnyard grass (*Echinocloa crusgalli*), averaging in the former 21 per cent. in 1922 and 14 per cent. in 1923, and in the latter 10·9 per cent. in 1922 and 9·6 per cent. in 1923. The average mortality in all food-plants and localities was 9·4 per cent. in 1922 and 8·3 per cent. in 1923.

In maize stalks tied to stakes in various localities throughout the infested area mortality was somewhat greater in the winter of 1922-23 than in that of 1923-1924, and also in the more northern regions. In 4 infested localities in Massachusetts, not in river valleys, the mortality averaged 3·9 per cent., and in 2 inland localities in river valleys, 22·6 per cent. in the spring of 1923, while 29 localities averaged 2·6

per cent. in the spring of 1924. From a study of winter weather in 15 localities representing the entire infested area, no one factor alone seems to be responsible for winter mortality, but the extent of mortality seems to be associated with winter severity.

Barss (H. P.) & Mote (D. C.). **1925 Revised Spray Program.**—*Better Fruit*, xix, no. 8, pp. 12–13 & 20–23. Portland, Oregon, February 1925.

Notes are given on the control of different pests and diseases of fruit trees in Oregon, with revised spray calendars adapted to the more humid orchards west of the Cascade Mountains and the arid and irrigated regions east of these mountains.

Hoerner (G. R.). **Advances achieved in Orchard Dusting.**—*Better Fruit*, xix, no. 8, pp. 14–15 & 18, 2 figs. Portland, Oregon, February 1925.

The development of the machinery and materials used for dusting orchard trees during the past year is briefly reviewed. Tables are given showing the type of dust and time of application against the various pests on different types of trees.

St. George (R. A.). U.S. Bur. Ent. **Egg and first-stage Larva of *Tarsostenus univittatus* (Rossi), a Beetle predacious on Powder-post Beetles.**—*Jl. Agric. Res.*, xxix, no. 1, pp. 49–51, 1 fig. Washington, D.C., 1st July 1924. [Received 20th February 1925.]

The Clerid, *Tarsostenus univittatus*, Rossi, which, according to Champlain, is principally a predator on powder-post beetles such as *Lyctus* and *Xylobiops* (*Sinoxylon*), was found in association with *L. planicollis*, Lec., during experiments on the latter [*R.A.E.*, A, xiii, 45]. Most of the beetles probably pass the winter in the larval stage, though a few may pupate before early spring, especially if in wood in a heated building. In December 1923, samples of infested wood were kept at a temperature of 70° F., or slightly higher. When examined 5 weeks later, most of the beetles were in the larval stage, but two pupae and three maturing adults were found. Probably the adults of *T. univittatus* emerge about the same time as those of their host. The eggs are probably laid in the galleries of the host; they hatch in about ten days. In one case a mature larva was observed to crawl over the surface of the wood and enter a gallery of *L. planicollis*, so that it seems that the larva does not confine its attack to a single host. The process of oviposition and hatching under experimental conditions and the egg and first stage larva are described.

Weigel (C. A.), Broadbent (B. M.), Busck (A.), U.S. Bur. Ent., & Heinrich (C.). **The Greenhouse Leaf-tyer, *Phlyctaenia rubigalis* (Guenée).**—*Jl. Agric. Res.*, xxix, no. 3, pp. 137–158, 5 pls. Washington, D.C., 1st August 1924. [Received 17th February 1925.]

The greenhouse leaf-tyer, *Phlyctaenia rubigalis*, Gn., is an important and destructive enemy of chrysanthemum, cineraria, snapdragon and a large number of other ornamental and greenhouse plants. It is widely distributed throughout the United States, Canada, and Central and South America. The synonymy of this moth is discussed and all its stages described, the characters distinguishing the males, females

and larvae from those of the European, *P. ferrugalis*, Hb., being indicated [*R.A.E.*, A, xi, 84].

The adults may live as long as 23 days; but the average life of a female is 9 or 10 days, while that of a male is only 4 or 5. The moths are nocturnal in habit, showing much less activity during the daytime.

Oviposition may continue for about 2 weeks, the eggs being deposited singly or in clusters on the lower surface of leaves during the night. Egg-laying rarely begins until 24 hours after emergence. The period of incubation varies from 4 to 10 days and averages 6·5 days. Five larval instars occur, and it requires from 15 to 30 days, with an average of 21, to complete the larval development. The larvae usually feed on the lower surface of the leaf, or in the rolled leaf or in leaves webbed together for their protection, though in some plants the leaves may be skeletonised, and even the blossoms attacked. Pupation takes place in a slight silken cocoon in folded leaves, except when the plant is too badly skeletonised. The pupal period requires from 6 to 16 days, with an average of about 10. Nine distinct generations were reared during 1921, indicating that there may be a definite overlapping of generations throughout the year under greenhouse conditions. In summer *P. rubigalis* also causes serious injury to vegetable and garden crops, especially celery, beet, and lettuce.

Spiders and ants are important enemies of this moth. The small spider, *Theridium tepidariorum*, Koch, confines its attention to destroying the larvae and adults, the pupae being apparently unmolested. The red ant, *Monomorium pharaonis*, L., was not observed to disturb the eggs, but attacked all other stages, being especially destructive to the pupae and adults. No insect parasites were reared during these experiments, but the following have been recorded in the United States :—an Ichneumonid of the genus *Synetaeris*, a Braconid, *Apanteles glomeratus*, L., and a Tachinid, *Phorocera parva*, Big.

In the case of a heavy infestation the following control measures are recommended :—Fumigation after dusk twice at intervals of seven days with hydrocyanic-acid gas, to destroy the adults, using 1 oz. of sodium cyanide per 1,000 cubic feet of air space, with an hour's exposure. The day following the first fumigation the plants should be treated with arsenical insecticides. When it is not feasible to fumigate, persistent dusting with 5 per cent. nicotine sulphate is recommended against the moths. For well developed plants in permanent beds, dusting with a dry mixture consisting of 1 part calcium or lead arsenate and 9 parts superfine sulphur is very effective, and should be applied by a modern type of hand duster. For low-growing or potted plants, spraying with 1 oz. lead or calcium arsenate powder to 1 U.S. gal. of water is recommended. Smaller plants may be immersed in the solution. Promptness and thoroughness in the application of arsenicals, especially to the lower surface of the leaves, are important factors in the control of the larvae.

SNYDER (T. E.). U.S. Bur. Ent. **New Termites and hitherto unknown Castes from the Canal Zone, Panama.**—*Jl. Agric. Res.*, xxix, no. 4, pp. 179–193, 2 pls., 9 figs. Washington D.C., 15th August 1924. [Received 20th February 1925.]

A list is given of the known termites of the Canal Zone and adjacent Panama territory, and 7 new species are described. The biology of these termites, and their distribution, economic importance and control will be discussed in a subsequent paper.

Siegler (E. H.) & Popenoe (C. H.). U.S. Bur. Ent. **Some Insecticidal Properties of the Fatty Acid Series.**—*Jl. Agric. Res.*, xxix, no. 5, pp. 259–261. Washington, D.C., 1st September 1924. [Received 7th March 1925.]

There has apparently been no serious investigation for the determination of the active principle chemically responsible for the value of soaps as contact insecticides. This paper includes the theoretical aspects and promising practical applications resulting from one year's observations; it is hoped to publish more detailed information later. The principal subjects of these tests were *Anuraphis roseus*, Baker (rosy apple aphis), *Aphis pomi*, DeG. (green apple aphis), *A. rumicis*, L. (bean aphis), *Macrosiphum sanborni*, Gill. (black chrysanthemum aphis), *M. ambrosiae*, Thos. (aster aphis), and *Myzus cerasi*, F. (black cherry aphis). Practically all tests were made on a laboratory scale in an outdoor insectary; the fatty acids were applied in the free form, and as acid, neutral and alkaline soaps, using potassium and ammonium bases. In the free form they were emulsified by means of various stabilisers. The fatty acids show unusual wetting and spreading powers when applied in the form of an emulsion either to insects or foliage (even those of nasturtium and cabbage). The toxicity increases with the molecular weight, at least to a certain point not yet definitely determined. In contradistinction to the action of nicotine, no variation in toxicity was noticed under varying summer temperatures and humidity; the low volatility of the fatty acids apparently insures the retention in the body of the insect until action is complete. Plants show a varying susceptibility to scorching by the acids of this chemical series. In most cases dilutions fatal to the Aphids were not injurious to the plants.

Of the various fatty acids tested, the commercial product known as double distilled coconut fatty acid was chosen as embodying the greatest degree of desirable features. This product is liquid at usual summer temperatures, highly toxic even when greatly diluted, stable with lubricating oil emulsions, readily obtainable, and cheaper than nicotine. The addition of an equal amount of benzol gasoline prevents solidification, and the addition of powdered glue as a colloidal stabiliser retards separation after emulsification. The following stock emulsion has been tentatively adopted as a practicable basis for further tests; double distilled coconut fatty acid, 200 cc., gasoline (benzol) 200 cc., glue (granular) 100 gm., and water 525 cc. This formula used at the rate of 1 part to 800—1,200 parts of water against *A. pomi* produced a mortality of 94—98 per cent., equivalent to the rates obtained with commercial 40 per cent. nicotine sulphate in parallel tests at the same dilution. Prepared by this formula coconut fatty acids have compared favourably in efficiency, pound for pound, with commercial nicotine preparations at less than one fourth the cost per gallon of spray mixture.

Myers (P. R.). U.S. Bur. Ent. *Polyscelis modestus* **Gahan, a minor Parasite of the Hessian Fly.**—*Jl. Agric Res.*, xxix, no. 6, pp. 289–295, 2 pls. Washington, D.C., 15th September 1924.

The Pteromalid, *Polyscelis modestus*, Gah., was first reared from the Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, in 1915, but

was not described till 1922 [*R.A.E.*, A, x, 422]. It is uncommon, and has not been recovered since 1918. It has been reared in Maryland and Pennsylvania.

P. modestus is normally a primary, solitary parasite of the Hessian fly, but it has also been shown to be a hyperparasite by the rearing of a single male from a puparium that contained the cocoons of a Platygasterid, probably *Platygaster vernalis*, Myers. *P. modestus* usually attacks the larvae of *M. destructor*, but cases have been recorded where it has developed also upon the pupae. It feeds externally on its host within the puparium. The maximum percentage of parasitism obtained from the spring generation was 0·85 per cent. and from the autumn generation 1·5 per cent.

In July the eggs of the parasite hatched in 1 or 2 days. The duration of the larval stage varies from 4 to 11 days, the average being slightly more than 6. There is a prepupal stage of from 5 to 96 hours, with an average of 25. The pupal stage lasts from 5 to 8 days, the average being 6·3. The total period from oviposition to the emergence of the adult was from 11 to 18 days. The life of the adult female was from 7 to 39 days, and that of the male considerably shorter, the average being about 9 days. In the few specimens observed the males were as numerous as the females, but it is possible for this species to reproduce parthenogenetically, in which case the resulting insects are males. In the laboratory oviposition first occurred from 5 to 7 days after the emergence of the adult, but under natural conditions it probably begins somewhat earlier. It was not uncommon to find 2 or 3 eggs or more than one parasitic larva within the same puparium, but this is thought to be abnormal and not to occur in nature, and in no case did more than one adult emerge.

Before being consumed by the parasite, the internal contents of the host are liquefied probably by a digestive fluid injected by the parasite.

LARSON (A. O.) & FISHER (C. K.). U.S. Bur. Ent. **Longevity and Fecundity of** *Bruchus quadrimaculatus* **Fab. as influenced by different Foods.**— *Jl. Agric. Res.*, xxix, no. 6, pp. 297–305. Washington, D.C., 15th September 1924.

This paper deals with the length of life of *Bruchus quadrimaculatus*, F., infesting cowpeas, as influenced by different kinds of food and also by mating and reproduction, the number of eggs and their viability as influenced by the food and age of the parent female, and the asexual production of eggs. These points are related to the rate of increase as well as to the control of the beetles.

The views of previous authors are discussed, the assumption being that no food is required by the adult and that as soon as the energy stored up by the larva is exhausted the adult dies. This is borne out by the fact that adults of both sexes are smaller at the end of life than at the time of emergence and the female shrinks to about one-third her former size. *B. quadrimaculatus* lives longer at a low temperature than at a high one, but does not produce more eggs. In a warehouse the adults find conditions favourable for reproduction during their short life. There is a long period every summer when there is no suitable place for oviposition in the field, but the crops become infested later. This would indicate either that the infestation is caused by beetles that have emerged shortly before the crop is

sufficiently matured for oviposition, or that the female has the ability in the field to assimilate material normally going to form part of the quota of eggs until a suitable place is found for the deposition of the remainder of the eggs, or that some kind of nourishment (dew, nectar, honey dew, etc.) is consumed that prolongs her life.

In experiments the difference in average length of life of females receiving no food and those receiving water was ten or eleven days. Sugar-water in some cases lengthened their life by as much as 27 days. Access to water increased the number of eggs laid by about 30 per cent., and to sugar-water by about 50 per cent. Frequent mating, such as occurs under storage conditions, reduced the length of life of both males and females. Females that mated only once soon after emergence deposited large numbers of fertile eggs. No fertile eggs were produced parthenogenetically.

Dozier (H. L.). **The Japanese Camphor Scale.**—*Alabama Polytechnic Institute*, Extens. Serv., Circ. 75, 15 pp., 15 figs. Auburn, Ala., December 1924. [Received 2nd March 1925.]

The camphor scale, *Pseudaonidia duplex*, Ckll., was originally found on *Camellia japonica* at San Francisco, and intercepted on orange trees arriving from Japan, but it has been exterminated in California. It was first reported from New Orleans in 1920. Seven localities in the United States are at present known to be infested, two in Louisiana, one in Texas, and four in Alabama. In New Orleans the scale is so well established on camphor and other ornamental plants that there is no hope of its eradication. In one locality in Alabama an infestation on figs and Satsuma oranges was found and several infested citrus properties in the vicinity were also discovered. One heavy infestation was traceable to a shipment of 200,000 *Citrus trifoliata* direct from Japan. Another was thought to have originated through the use of field boxes previously employed for the packing of fruit in an infested area, without disinfestation.

P. duplex is the most serious enemy of the camphor tree known in the United States, but it is not known to attack this plant in Japan, although it is an important pest on different varieties of *Citrus*. The Japanese persimmon [*Diospyros kaki*] is very susceptible to attack. Pecan and fig do not seem to be seriously injured; grape-vines, pomegranates, pears and loquats are all recorded as food-plants, though their degree of susceptibility to attack is as yet undetermined. As the scale is also known to infest the peach and crab apple, it may be able to withstand much lower temperatures and establish itself in the commercial peach and apple belts.

The camphor scale mainly attacks young branches, leaves, and twigs. The male is always found on the leaves but the female prefers the fruit and twigs. *P. duplex* has been thought to have the power of secreting a toxin that affects the plant, and the small number of scales required to produce death to a twig of camphor or rose tends to support this. The toxic property is not exhibited to any great extent on *Citrus*.

The average life-cycle from one generation to the next occupies 72 days. There are certainly three generations a year, and probably a fourth, but they continually overlap. This scale has few natural enemies, but an internal parasite, *Aspidiotiphagus citrinus*, Craw, is becoming more abundant, and two Coccinellids, *Chilocorus bivulnerus*,

Muls., and *Microweisea misella*, Lec., are predacious on it. A newly-described thrips, *Karnyia weigeli*, Wats., apparently feeds only on it.

The cheapest and most effective insecticide is one of the standard oil emulsion sprays. After the camphor scale was discovered in New Orleans, shade trees were severely pruned and then sprayed with oil emulsion, the original strength used for summer spraying being 1 gal. of an emulsion containing 2 gals. oil to 1 of water diluted with 32 of water. Roses, elms, and a number of other trees and shrubs were practically defoliated by this strength, and it was changed to 1 : 40. New buds were put out, and in a few weeks the trees appeared in a much healthier condition than before spraying. The formulae recommended are: 2 U.S. gals. light oil (Diamond paraffin), 1 U.S. gal. water, and either 4 oz. calcium caseinate or 2 lb. potash fish-oil soap. The emulsion with calcium caseinate will mix with lime-sulphur solution, whereas the other will not. For *Citrus* the emulsions should be diluted with 40 U.S. gals. water for winter spraying or 50 for summer spraying. It has not yet been determined how much oil a citrus tree can stand during a season and how often the spraying may be done with safety.

GIBSON (A.). **The Development of Applied Entomology in Canada 1914-1923.**—*16th Ann. Rept. Quebec Soc. Prot. Plants 1923-24*, pp. 24–56. Quebec [1924].

The organisation and extension of applied entomology in Canada from 1914 to 1923 is reviewed, including brief summaries of the work of the individual Provincial Stations.

During this period much progress has been made. The federal entomological service has been developed to a marked degree. The staff has been greatly increased, and an efficient divisional organisation has been worked out. Important advances have also been made as the result of provincial and other activities.

BRITTAIN (W. H.). **Entomological Teaching in its Relation to Farm Problems.**—*16th Ann. Rept. Quebec Soc. Prot. Plants 1923-24*, pp. 60–66. Quebec [1924].

In the past attention has been focussed largely on those students who are preparing for a degree, thus neglecting the great majority who have no opportunity to do this and yet are in need of practical assistance. The instruction available in the agricultural colleges is capable of considerable improvement from the standpoint of the future farmer, and an outline is given of the essential features of a suitable course.

ROSS (W. A.). **The Orchard Entomologist.**—*16th Ann. Rept. Quebec Soc. Prot. Plants 1923-24*, pp. 67–72, 10 figs. Quebec [1924].

The work of an orchard entomologist is described, with special reference to the equipment and organisation of the extension service of the Vineland station in Ontario.

HUTCHINGS (C. B.). **The Life-history, Habits and Control of the Lesser Oak Carpenter Worm.**—*16th Ann. Rept. Quebec Soc. Prot. Plants 1923-24*, pp. 96–114, 9 figs. Quebec [1924].

The Cossid, *Prionoxystus macmurtrei*, Guér. (lesser oak carpenter worm) has been responsible for considerable injury to red oak (*Quercus rubra*) in certain areas of the Ottawa valley during the past years. It is apparently mainly found in eastern Canada and the Atlantic States, but occurs as far south as Texas and as far west as Minnesota. Apart from three references recording this species from chestnuts, various unnamed trees, and black oak respectively, it has only been found on red oak. The characteristics and economic status of this tree are discussed.

The various stages of the moth are described. The eggs are laid in June, preferably in crevices of the bark, the total number per female varying from 50 to over 275. The larvae begin to hatch in 10 days and at once search for a crack or hollow in which to enter. Small quantities of brown, sand-like castings held together by invisible silk threads are signs of early larval work. The formation of the larval gallery is described. Three seasons are spent in the larval stage; the first in the outer layers of the bark, and the second in the sapwood, while during the third boring continues in the woody parts of the tree until September. The third winter is spent as a pupa in the tunnel, though occasionally pupation may be delayed until the following spring. Those individuals pupating in the autumn emerge as adults early in June; the spring pupae emerge later. The larvae sometimes leave their tunnels and even wander from the food-plant. Infested trees may become what are known as "brood trees", the successive generations boring further into already existing tunnels. Trees thus attacked become badly honeycombed. No part of the tree is immune from attack, and even the small branches one inch in diameter have been found intersected with larval burrows. The most important natural enemies of *P. macmurtrei* are birds. Woodpeckers destroy the larvae, and other birds the eggs. Only one unidentified Dipterous parasite was reared from a two year old larva taken from a log.

Carbon bisulphide injected into the tunnels, which must, however, be plugged at once, has given satisfactory results, but is only applicable in small areas. For more extensive treatment a mixture of 5 lb. lead arsenate, 40 gals. water and ½ gal. kerosene emulsion or miscible oil should be carefully sprayed into the exit holes and wherever there are indications of larval activities.

PETCH (C. E.). **A Fruit Worm** (*Graptolitha laticinerea* **Grote**) **and its Control.**—*16th Ann. Rept. Quebec Soc. Prot. Plants 1923-24*, pp. 114–116. Quebec [1924].

Graptolitha laticinerea, Grote, was responsible for the defoliation of many trees in Quebec during 1923. The larvae of this moth are found on various trees and shrubs, the maximum injury occurring on elm, maples and dogwoods [*Cornus*]; other trees attacked included apple, soft maple and chestnut. Infestation is greater in sheltered than in windswept areas. The eggs are laid on the lower surface of the tips of the outer branches, at the base of the buds, or on the bud scales,

but in the last-named position they frequently fall to the ground before hatching. Pupation occurs in July, 2 to 4 inches below the soil surface.

The remedial measures recommended by previous authors are reviewed.

FULMER (H. L.). **The New Spray Materials.**—*Canadian Hortic.*, Fruit Edn., xlviii, no. 2, pp. 27–28 & 46–49. Peterboro, Ont., February 1925.

The more important recent advances in spray materials are discussed, their preparation and application being described. Those dealt with include lubricating oils, free nicotine, paradichlorobenzene, crude white arsenic and calcium cyanide.

ROSS (W. A.). **Niagara Peninsula Grape Insects.**—*Canadian Hortic.*, Fruit Edn., xlviii, no. 2, p. 30. Peterboro, Ont., February 1925.

The grape-berry moth [*Polychrosis viteana*, Clem.] may be controlled by spraying with 1½ lb. lead arsenate, 1 lb. soap and 40 gals. Bordeaux mixture [*R.A.E.*, A, xi, 234]. In the case of the grape-vine flea-beetle [*Haltica chalybea*, Ill.] 2 lb. lead arsenate, ½ gal. cheap molasses and 40 gals. water, applied as soon as the beetles appear in numbers, will largely prevent injury to the buds. Besides the measures already noticed [*R.A.E.*, A, xii, 276] spraying with 1½ lb. lead arsenate in 40 gals. Bordeaux mixture is recommended for the control of the larvae; this should be applied just after the fruit sets. The grape blossom midge [*Contarinia johnsoni*, Sling.] is widely distributed, and though it is not of much importance at present, vine-growers are urged to report its occurrence in unusual numbers.

DUSTAN (A. G.). **The Control of the European Apple Sucker, *Psyllia mali* Schmidt., in Nova Scotia, particularly by the Fungous Disease *Entomophthora sphaerosperma* Fres.**—*Canada Dept. Agric.*, Pamph. N.S., 45, 13 pp., 8 figs. Ottawa, May 1924. [Received 2nd March 1925.]

The apple sucker, *Psylla* (*Psyllia*) *mali*, Schmidb., first discovered in Nova Scotia in 1919, has since spread very rapidly, particularly in the direction of the wind, and its range will probably soon extend over the whole of the apple growing area of the Province. So far it has not been found in any other part of America.

Its bionomics are discussed [*cf. R.A.E.*, A, x, 307]. The winter is passed in the egg stage on the twigs and fruit-spurs of apple trees. Usually about the first week in May the nymphs begin to emerge and work their way into the opening buds. Later they enter the opening flowers, clustering around the base of the stamens and pistil. The adults appear in June, and mating may take place within a fortnight, but in most cases it is much later. Although there is only one generation a year, the active life of the insect extends over approximately 7 months, more than 5 of which are passed in the adult stage. The length of this stage is of importance when viewed in the light of fungus control.

The percentage of control by all measures practised was small, except for that exercised by the fungus, *Entomophthora sphaerosperma*. The methods used in the artificial dissemination of this disease [*R.A.E.*,

A, xi, 157] and the manner of its spread in nature are described. Only the adults are attacked, the fungus developing first in the blood-stream and then invading all parts of the host. The diseased insects are most numerous on the lower limbs of infested trees. They are also found on weeds and suckers growing at the base of such trees and more or less thinly distributed over the upper branches. In 1922 the disease appeared on July 17th and was still present in September. In 1923 the first epidemic was seen in experimental cages during the latter part of June, and in the orchards diseased forms were found, in which the organism was actively discharging spores as late as the last week in October. In spreading the disease the results were thought to be rather better when the insects were distributed on several trees in an orchard in the morning before the dew had dried. As a rule 2 or 3 "plantings" sufficed to start an epidemic, providing that conditions were favourable. In the spring of 1923 experiments were made in cages with a view to obviating the difficulty of getting the disease started in the orchards early enough to be of use before cold weather set in, checking the growth of the fungus. The outbreak of epidemics is dependent almost entirely on three factors, *viz.*, correct relative humidity, a high temperature, and abundance of the host insect. It is probable, however, that under cage conditions the virulence of the disease increases very rapidly, owing to the speed with which the fungus can pass from one generation to the next. This might make it possible to get an epidemic started in dry seasons when an outbreak would not appear naturally.

In general there are 3 periods in any season when artificial control measures can be practised with advantage, firstly, prior to the hatching of the eggs, secondly, when the blossoms are showing pink, and thirdly in the early autumn after the adults have migrated back into the orchards preparatory to oviposition. Details of dusting and spraying are given [*R.A.E.*, A, x, 307 ; xi, 383].

DE GRYSE (J. J.). **Injurious Shade Tree Insects of the Canadian Prairies.**—*Canada Dept. Agric.*, Pamph. N.S. 47, 23 pp., 22 figs. Ottawa, August 1924. [Received 2nd March 1925.]

This pamphlet discusses in a popular manner the work and habits of the principal insects injurious to shade trees on the Canadian prairies and the most effective methods for their control.

SWAINE (J. M.). **The Control of the Destructive Spruce Bark-beetle in Eastern Canada.**—*Canada Dept. Agric.*, Pamphlet N.S. 48, 26 pp., 7 pls. Ottawa, December 1924. [Received 2nd March 1925.]

Dendroctonus piceaperda, Hopk., in Eastern Canada and *D. borealis*, Hopk., in British Columbia are the most destructive enemies of mature spruce throughout the coniferous forests of Canada, except the spruce bud-worm [*Tortrix fumiferana*, Clem.] on red spruce [*Picea rubra*] in New Brunswick. The last recorded outbreak, and the first to be studied carefully, occurred throughout a large part of Maine and New Brunswick and in south-eastern Quebec during the years 1897–1901. During the decade previous to 1915, *D. piceaperda* appeared to be exceedingly rare in Eastern Canada. Since then extensive outbreaks have developed

and spread, and it has become common as far west as Lake Superior. During the last five years, outbreaks have occurred in Newfoundland, Manitoba and northern Saskatchewan. Numerous large or small outbreaks in various parts of British Columbia and northern Alberta caused by this species or its Western representative, *D. borealis*, have also been met with during the last 10 years.

The adult beetles fly readily and spread the infestation from trees they have killed or from stumps, windfalls, etc., to living trees in the neighbourhood. They emerge from the infested bark during the summer and enter the uninjured bark of dying or living trees. They never attack dead trees. The female deposits numerous eggs along the sides of a tunnel bored through the bark to the wood surface, and the larvae excavate individual mines in the inner bark. The general appearance of a beetle-infested forest is quite characteristic, spruce turning red in clumps and scattered patches. When green, standing trees are attacked, masses of gum called "pitch-tubes" are almost invariably formed around the entrance holes, distinguishing the infested trees even before the foliage has changed colour.

Dendroctonus breeds freely in dying trees, but when the beetles are numerous they select the largest mature trees, attacking them during summer, and by the following spring at latest the trees are dead. The beetles leave the trees finally the following season. Hibernation takes place in the tunnels as old and very young adults and larvae in all stages. The multiplicity of broods taking part in an infestation and the differing conditions of hibernation result in an almost continuous attack throughout the season. The heaviest emergence of adults and attack on fresh trees takes place late in June and early in July, and a second, apparently somewhat lighter, emergence and attack occurs from the last week of July through the first half of August. Attack by *Dendroctonus* on green trees is usually followed closely by swarms of other bark-beetles, of which only *Polygraphus rufipennis*, Ky., *Ips borealis*, Sw., and *I. perturbatus*, Eichh., enter the bark early enough to be of any assistance to *Dendroctonus* in overcoming the resistance of the trees. Brief notes are given on their bionomics.

An examination of an area burnt in July 1921 showed no beetle attack in the fire-injured trees at that time; but a very heavy infestation of sound green trees by *Dendroctonus* was then in progress and much of the fire-injured spruce on the burnt area was also attacked by it later in the season. In July 1922, however, it was found that the fire-injured trees had attracted practically all the *Dendroctonus* and secondary beetles from the green timber for a distance of at least a mile. It was evident that if the infested trees on the burnt area could be logged in the winter the outbreak would be checked. In July 1923, although the removal of the infested trees there was not complete, very little fresh infestation could be found in the surrounding green timber. If the logging had not taken place, it is possible that the fire would have accelerated the outbreak after the first season.

Bark in a slightly weakened condition is undoubtedly preferred, and extensive windfalls appear to have been the most important factor in the development of outbreaks in recent years. When *Dendroctonus* is abundant, as little fresh spruce wood as possible should be exposed, except on trees to be employed as traps. Green and rapidly growing trees of the largest size are readily attacked when there is not a sufficient amount of dying bark available, but outbreaks mostly occur in old, mature timber.

Parasites have not apparently played an important part in the control of the cases studied, nor have predators, particularly Clerid beetles, been abundant, but woodpeckers are often an important factor in checking or preventing outbreaks. The keen competition in the brood trees between *Dendroctonus* and myriads of *Ips, Polygraphus, Dryocoetes, Pissodes, Monochamus* and others must be one of the most important factors in holding outbreaks in check. The control consists in cutting down and destroying the bark of the freshly infested trees during winter so that the broods of beetles will be killed and the spread of the outbreak checked. The methods of organising the work under various circumstances are discussed.

GLENDENNING (R.). **The Satin Moth in British Columbia.**—*Canada Dept. Agric.*, Pamph. N.S. 50, 14 pp., 1 map, 8 figs. Ottawa, October 1924. [Received 2nd March 1925.]

The satin moth, *Stilpnotia salicis*, L., a native of Europe and Western Asia, feeds on poplars and willows. In British Columbia the infested area of the mainland covers approximately 50 square miles, and on Vancouver Island it is distributed along the south-eastern coast. The flight of moths in 1920 caused the infestation of practically every lombardy and white poplar in New Westminster. The various outbreaks in 1921-1923 are discussed, and the affected areas are shown on a map. In 1923, incipient stages of an outbreak were noted in Victoria, but an examination of numerous poplars failed to show any autumn feeding by the caterpillars.

The details of the life-history are similar to those recorded in the United States [*R.A.E.*, A, ix, 574]. The earliest date of hibernation observed was 15th August, and practically all the larvae are hibernating by the middle of September, except those feeding on cottonwood, which may often be found until the end of the month. Hibernation occurs in the third instar, and the first larvae emerge about 20th April. The fourth stage larvae eat the whole of the leaf substance instead of skeletonising it as in previous instars. The pupal stage occupies about 9 days. The moths are attracted to lights, particularly the males. They can fly as far as 5 miles with the wind, but usually do not go far.

The introduced poplars, black (*Populus nigra*), lombardy (*P. nigra italica*), white or silver leaf (*P. alba*), and Carolina (*P. deltoides*) are the chief food-plants, and practically all the damage in British Columbia has been to these trees. Of two native species, the aspen (*P. tremuloides*) and cottonwood (*P. trichocarpa*), only the latter was attacked, but though the damage has so far been slight, the insect appears to be adapting itself to this tree. In 1922 the larvae of *S. salicis* were found on two species of willow (*Salix lasiandra* and *S. babylonica*), but most of the species of willows are not affected even if close to outbreaks on poplar.

The chief factor in natural control is winter mortality of the third stage larva. Parasitism of the larvae by *Tachina mella*, Walk., and *T. robusta*, Towns., is the only other factor of any importance. In 1922 parasitism by these flies varied from 25–80 per cent. *Sarcophaga houghi*, Aldr., *S. aldrichi*, Pk., and *Agria affinis*, Fall., were also recovered each year, but have been a very small factor in control. Four Ichneumonids, including *Ephialtes pedalis*, Cress., and *Theronia fulvescens*, Cress., were reared in 1921 and 1922; they

attacked the last larval or pupal stages and emerged at varying dates in August and September. A small Chalcidoid, *Amblymerus liparidis*, Vier., a pupal parasite, was observed ovipositing during July, emerging in August. It apparently uses some other host during the winter, or hibernates as an adult. Several were reared from a single host pupa.

Although the caterpillars may be readily killed by lead arsenate, the height of lombardy poplars or cottonwoods precludes organised spraying. The white poplar is not usually more than forty feet high, and ordinary orchard spray-pumps could be used with good effect. The spray is best applied about the middle of May. In spring-spraying of lombardy poplars, in particular, soft soap should be added on account of the extreme smoothness of the leaves. To prevent the spread of the larvae an inspection of nursery stock of willows and poplars in September is desirable. Where any evidence of autumn feeding is found, the stock should be dipped before shipment in a ten per cent. oil emulsion.

Swaine (J. M.) & Craighead (F. C.). **Studies on the Spruce Budworm (*Cacoecia fumiferana* Clem.). Part i. A general Account of the Outbreaks, Injury and Associated Insects.**—*Canada Dept. Agric.*, Bull. N.S. 37 (Ent. Bull. 25), pp. 1–27, 1 map, 25 pls. Ottawa, December 1924.

The history of previous outbreaks of *Tortrix* (*Cacoecia*) *fumiferana*, Clem. (spruce budworm) in Eastern Canada is reviewed. One of the most important features of these epidemics from the standpoint of future recommendations for prevention or control is to determine an accurate history of the origin and spread. If they originate in and cover enormous areas in one or two years, it is obviously impossible to adopt artificial remedial measures. If, however, the development of an outbreak covers several years in a limited area, it might be possible to prevent its spread. The survey work in connection with the present outbreak is discussed; in this connection aeroplanes proved of great value, affording a rapid and effective method of obtaining general information concerning the extent of an infestation.

Provided that sufficient numbers of localities are observed, it is possible to reconstruct the history of an outbreak accurately from the appearance of the annual rings on the trees. From this evidence it is thought that there may have been three separate outbreaks. In 1909 the outbreak developed in a balsam forest, this being the first record for eastern Quebec based on ring counts. Observations based on ring retardation indicate 1913 as the first appearance in New Brunswick. Whether the infestation in the adjoining areas of Maine was an independent outbreak or spread from the bordering territories has not been decided. The outbreak centering about Lake Opasatika began in 1918.

The various stages of *T. fumiferana* are described. The actual feeding of the caterpillars usually lasted only four years in each locality. The extent of the mortality depended upon the ability of the trees to withstand this feeding. In young forests a return to normal vitality may be established shortly after feeding stops with a loss of 15 to 20 per cent. of the standard general loss of increment. The combined effect of borers in the sapwood and heart-rotting fungi make the trees very susceptible to windfall. The danger from forest fires is greatly increased.

The secondary insects associated with *T. fumiferana* are *Dendroctonus piceaperda*, Hopk. (eastern spruce bark-beetle), *Polygraphus rufipennis*, Kirby (four-eyed spruce bark-beetle), *Pityokteines sparsus*, Lec. (balsam bark-beetle), *Ips perturbatus*, Eichh. (Canadian spruce bark-beetle), *I. borealis*, Swaine (northern spruce bark-beetle), *I. longidens*, Swaine (eastern long-toothed bark-beetle), *Dryocoetes americanus*, Hopk., and *D. affaber*, Mannh. The notes on these species are intended to give a general picture of the characteristic features of these insects, so that all characters, taken together with the food-plant in which they are found, should distinguish them from other associated insects of minor importance. The bark-beetles of minor importance occurring in spruce in eastern Canada are *Dendroctonus valens*, Lec., *Scierus annectens*, Lec., *Hylurgops pinifex*, Fitch, *Phthorophloeus piceae*, Sw., *Crypturgus atomus*, Lec., *Scolytus* (*Eccoptogaster*) *piceae*, Sw., *Pityophthorus nitidus*, Sw., *P. opaculus*, Lec., *P. nudus*, Sw., *Pityogenes hopkinsi*, Sw., *Ips chagnoni*, Sw., *I. pini*, Say, *I.* (*Orthotomicus*) *caelatus*, Eichh., *Gnathotrichus materiarius*, Fitch, and *Trypodendron bivittatum*, Kby. Notes are given on *Pissodes dubius*, Rand. (balsam bark weevil), *P. rotundatus*, Lec. (spruce weevil), *Monochamus scutellatus*, Say (black sawyer), *M. marmorator*, Kby. (balsam sawyer), *Trypodendron bivittatum*, Kby. (spruce ambrosia beetle), and *Tetropium cinnamopterum*, Kby. (four-eyed spruce borer). The leaf feeders, *Tortrix alleniana*, Fern., and *Dioryctria reniculella*, Grt., were abundant in the later years of the budworm cycle and have similar habits to *T. fumiferana*.

The various factors reducing the value of attacked trees such as injury of terminals resulting in distortion of the trees, etc., are discussed, and an estimate of the financial losses incurred in Quebec and New Brunswick is given.

CRAIGHEAD (F. C.). **Studies on the Spruce Budworm** (*Cacoecia fumiferana* **Clem.). Part ii. General Bionomics and Possibilities of Prevention and Control.**—*Canada Dept. Agric.*, Bull. N.S. 37, (Ent. Bull. 25), pp. 28–91. Ottawa, December 1924.

One of the most striking features of the injury by *Tortrix* (*Cacoecia*) *fumiferana*, Clem (spruce budworm) is its great variation in different forest regions and even within circumscribed areas. It is therefore necessary to study the insect in its relation to the various forest environments. The inter-relation of fungi and insects, the status of these organisms to the lowered vitality of the trees, and certain problems of plant physiology proved most perplexing, and a great deal of further investigation is essential in order to establish definitely the exact status of the insects and diseases.

Balsam [*Abies balsamea*] appears to be the favourite food-plant, both for oviposition and because the larvae can develop normally on the old foliage ; in all trees the new growth is preferred and entirely consumed before the old foliage is eaten. The larvae will feed on white, black and red spruce [*Picea canadensis*, *P. mariana* and *P. rubra*], hemlock, larch and white pine [*Pinus strobus*], though the last-named is only eaten by migrating larvae. The activities of the over-wintering larvae begin with the opening of the balsam buds. Feeding continues for from 21 to 40 days, depending on climatic conditions and the rate of the current year's growth. The pupal period lasts from 9 to 12 days. The emergence of the adults occurs about 2 days earlier

on white spruce than on balsam, while on red and black spruce development is retarded by as much as 7 to 10 days in the case of black spruce. The eggs hatch in from 9 to 12 days ; no feeding of the newly emerged larvae has been noticed, and they immediately seek a suitable place for hibernation. The general habits of the larvae are discussed.

Though some of the insects associated with *T. fumiferana* are actually primary under certain conditions, very few of those that attack trees injured by budworm can be considered as such. Many of these species are very adaptable, whilst others are most particular in their selection of certain logs. In the latter case the moisture content of the tree or log is one of the most restricting factors. It is evident that trees dying from defoliation and various methods of girdling may be repellent to some species while offering optimum conditions for others. On this basis the beetles affecting spruce and balsam may be divided into three groups. Of those mentioned as associated with the budworm in the previous paper, *Dendroctonus piceaperda*, Hopk., *Ips borealis*, Sw., *I. perturbatus*, Eichh., *I. chagnoni*, Sw., and *I. longidens*, Sw., have never been observed anywhere throughout the budworm infested territory attacking trees dying from this cause ; they seem to prefer a high moisture content of the inner bark and are capable under at least certain circumstances of killing healthy trees by gregarious attack. *Monochamus marmorator*, Kby., attacks trees that have been infested by budworm, but never felled trees, as it requires considerable moisture. *M. scutellatus*, Say, *Polygraphus rufipennis*, Kby., *Serropalpus barbatus*, Schall., *Tetropium cinnamopterum*, Kby., *Pityokteines sparsus*, Lec., *Trypodendron bivittatum*, Kby., *Pissodes rotundatus*, Lec., and *P. dubius*, Rand., are very abundant on defoliated trees, and all but the last-named are common in felled trees and slash. Though it was at first thought that the attack of the secondary insects was of much importance in the death of the defoliated trees, it is now evident that they are in reality of little significance, except in the case of *M. marmorator* 5 to 10 years after defoliation. About 30 per cent. of the trees die without being attacked by secondary insects. The various factors relating to the death of the trees are discussed, including defoliation, water supply, effect of low temperatures, maturity and vitality, and the shoe-string fungus (*Armillaria mellea*).

A characteristic of budworm attack is the reduction in growth of the annual rings laid on during and for several years following an outbreak ; it is also assumed that the first year of terminal reduction corresponds with the beginning of the outbreak. The appearance of these features is described. A feature of the dying trees is the absence of a layer of wood formed at the base of the tree for one, two, or even three years preceding death. The data concerning the injury from the standpoint of forest types are considered insufficient, as there are so many factors influencing either the degree of defoliation or the ability of the trees to recover from the effects of feeding within these types that each local variation must be considered as a unit in interpreting results. Epidemics of *T. fumiferana* can no doubt only develop when there is sufficient balsam. Mixtures of white and red spruce furnish equally favourable food, but this combination does not occur over extensive area. Past outbreaks seem to have occurred in the same region for intervals of some 50 years, which would roughly correspond to the time required for a new generation of balsam to become dominant. Future outbreaks will largely depend on the condition of the forests in respect of the percentage of balsam. The present methods of cutting

by diameter limit gradually tend to increase this percentage. Certain areas that have so far escaped injury because of the nature of their growth (second growth mixed with hardwoods) will show favourable conditions for *T. fumiferana* in from 10 to 20 years' time. The prevention of the recurrence of *T. fumiferana* is purely a question of forest management. A review of literature of the management of spruce shows that more experimental work is needed before satisfactory methods will be evolved; those so far suggested from various sources are given, all of which refer to the use of these forests for growing pulpwood.

Artificial methods of control depend on the accessibility of the forest areas; in this connection spraying and dusting have been considered, but require further study and development. Wholesale application of poison in the forest might be very injurious to bird and animal life, and its application on limited areas would have to be continued for from 3 to 5 years so as to kill the insects coming in from surrounding infested regions. A chapter on abnormalities of ring growth and cell structure is contributed by I. W. Bailey.

Treherne (R. C.) & Buckell (E. R.). **The Grasshoppers of British Columbia, with particular Reference to the Influence of Injurious Species on the Range Lands of the Province.**—*Canada Dept. Agric.*, Bull. N.S. 39 (Ent. Bull. 26), 47 pp., 3 pls., 18 figs.; [abridged as:] Circ. 25, 4 pp., 3 figs. Ottawa, October & December 1924. [Received 2nd March 1925.]

The grasshopper infestation in British Columbia in 1921–23 was unusually severe and was undoubtedly influenced by climatic and other conditions. The type of country infested is described, and a list of the herbaceous plants occurring in the different types of range is given.

The grasshoppers occurring in British Columbia in their order of comparative abundance as based on the observations of the past 5 years are:—The Acridids, *Camnula pellucida*, Scud., *Xanthippus neglectus*, Thom., *Trimerotropis monticola*, Sauss., *Platybothrus brunneus*, Thom., *Melanoplus infantilis*, Scud., *M. mexicanus atlantis*, Riley [as a result of the work of Rehn and Hebard, *M. atlantis* and *M. bilituratus*, Wlk., are regarded as geographical races of *M. mexicanus*, Sauss. (*affinis*, Scud.)], *Spharagemon aequale*, Say, *Metator nevadensis*, Bruner, *Melanoplus bruneri*, Scud., *Bradynotes chilcotinae*, Hebard, *Amphitornus nanus*, Rehn & Hebard, and *Aerochoreutes carlinianus*, Thom., and the Tettigoniids, *Anabrus longipes*, Caud., *Peranabrus scabricollis*, Thom., and *Steiroxys trilineata*, Thom.

Biological notes on these species are given; they all occur in sufficient numbers to cause material injury to agricultural crops, whilst *C. pellucida*, *P. brunneus*, *M. mexicanus atlantis* and *A. longipes* are liable to occur in the form of outbreaks. Their natural enemies include Sarcophagid flies, of which *Sarcophaga opifera*, Coq., which infests adult grasshoppers of various species, was found feeding on the eggs of *C. pellucida* in the soil in the Nicola valley in 1923. *S. hunteri*, Hough, has similar habits, and *S. tuberosa sarracenioides*, Aldr., is associated with various species and has been reared from the western cricket (probably *Anabrus longipes*) in the Okanagan Valley. The Tachinid, *Acemyia dentata*, Coq., was bred from *Chortophaga viridifasciata*, DeG., and has been taken in Ontario and Southern British Columbia. Other natural enemies include egg parasites, various fungi and bacteria, hairworms

and predators, which include Carabid and Meloid beetles. The latter, which feed on the grasshopper eggs, include *Pomphopoea aenea*, Say, *Epicauta puncticollis*, Horn, *E. oblita*, Lec., *E. fissilabris*, Lec., *Lytta cyanipennis*, Lec., and *L. infidelis*, Fall. The Carabids found commonly on the ranges of British Columbia are *Calosoma irregulare*, Wlk. (possibly a variety of *C. tepidum*, Lec.), *Percosia obesa*, Say, *Harpalus fraternus*, Lec., and *H. somnulentis*, Dej.

The most injurious grasshoppers are those occurring on a depleted range, so that measures that improve the range also lessen the danger of an outbreak [*cf. R.A.E.*, A, ix, 489, 603]. Sufficient evidence has been accumulated during the past 5 years to indicate that, providing areas are properly fenced for a series of years or for definite periods in a year, no permanent injury is caused to the stand of grass, though in years of outbreak the grasshoppers may severely attack mature grass in the neighbourhood of prominent breeding-grounds during July and August. In general the main breeding areas of the more injurious grasshoppers, particularly *Camnula pellucida*, are found in gravelly or alkaline soils or in any site where the soil is either exposed to the full heat of the sun or covered with a short, low-growing mat of vegetation.

Where baits are applicable, the Kansas or the Colorado baits are recommended [*R.A.E.*, A, xii, 17, etc.], their preparation and application being described.

Wolcott (G. N.). **The Comparative Resistance of Woods to the Attack of the Termite** *Cryptotermes brevis* **Walker.**—*Porto Rico Insular Expt. Sta.*, Bull. 33, 15 pp. Rio Piedras, P.R., August 1924. [Received 2nd March 1925.]

A list of the different woods has been compiled, arranged in the order of their resistance to attack by *Cryptotermes brevipes*, Wlk. Though this cannot be considered final, the results are sufficiently conclusive to show that cypress is absolutely resistant and almost as safe as creosoted wood, mahogany being rather less so.

Hernández (E.). **Represión de la oruga de la hoja del algodón.** [The Control of the Cotton Leaf Caterpillar.]—*Rev. Agric. Puerto Rico*, xiv, no. 1, pp. 43–44. S. Juan, P.R., January 1925.

A dust containing 1 part of lead arsenate and 3 or 4 of slaked lime was found superior to a spray of lead arsenate against *Alabama argillacea*.

Urich (F. W.). **Insect Pests of Cabbage, Tomatoes and Beans.**—*Agric. Soc. Trinidad & Tobago*, Soc. paper no. 786, 6 pp. Trinidad, 9th November 1922. [Received 6th March 1925.]

This is a popular account of the chief insect pests of cabbage, tomatos and beans in Trinidad, together with remedial measures for them.

Urich (F. W.). **Ants in relation to Agriculture.**—*Agric. Soc. Trinidad & Tobago*, Soc. paper no. 795, 9 pp. Trinidad, 14th June 1923. [Received 6th March 1925.]

This is a brief account of the life-history and habits of ants that attack cacao, sugar-cane and coconut in Trinidad, and their natural

and artificial control. *Eciton* spp. and Ponerines, of which *Odontomachus haematoda* is the best known example, are valuable as destroyers of noxious insects. Ants that foster Coccids include *Azteca* spp., *Dolichoderus bidens*, *Pheidole biconstricta*, *Solenopsis geminata*, and *Camponotus* spp.

SICARD (—). **Description d'une espèce nouvelle de Coccinellide.**—*Ann. & Mag. Nat. Hist.*, xv, no. 85, pp. 81–82. London, January 1925.

Cleothera bromelicola, sp. n., is described from Panama, where the larvae feed on *Pseudococcus bromeliae*, Bch.

MARSHALL (G. A. K.). **On New Curculionidae from Brazil (Coleoptera).**—*Ann. Mag. Nat. Hist.*, xv, no. 86, pp. 282–296. London, February 1925.

The new species described include *Hypsonotus rhombifer*, feeding on leaves of cacao; *Anthonomus pitangae*, breeding in fruits of the "pitanga" (*Eugenia uniflora*), which are used for flavouring; *Prionomerus bondari*, feeding on leaves of African oil palm (*Elaeis guineënsis*); *Collabismodes tabaci*, bred from stems of tobacco; and *Coelosternus manihoti* (also from West Africa), boring in the stems of cassava (*Manihot utilissima*).

GUIMARÃES (J. S.). **Lagartas inimigas do fumo na Bahia.** [Caterpillars injurious to Tobacco in Bahia.]—*Chacaras e Quintaes*, xxxi, no. 1, pp. 23–25. S. Paulo, 15th January 1925.

The larva of the Sphingid, *Protoparce paphus*, Cram., occurs on tobacco in Bahia in spring from September to November. The egg hatches in 4–8 days, and the larva feeds on the tobacco foliage for about 25 days, and then pupates underground. The adult oviposits 4 days after emergence on tobacco or other Solanaceae. Natural control is effected by birds, Hymenoptera including *Telenomus monilicornis*, Ashm., and Diptera including *Argyrophylax albincisa*, Wied. *Phthorimaea operculella*, Zell., and a number of Noctuids, including *Phytometra* (*Plusia*) *rogationis*, Guen., *Euxoa* (*Agrotis*) *segetum*, Fr., *Feltia annexa*, Freits., *Xylomyges sunia*, Guen., and *Prodenia ornithogalli*, Guen., also attack tobacco.

DE AZEVEDO MARQUES (L. A.). **As pragas das arvores de ornamentação publica no Rio de Janeiro.** [Pests of public ornamental Plants in Rio de Janeiro.]—*Bol. Minist. Agric., Ind., e Comm.*, xi, no. 4, pp. 109–122, 4 pls. Rio de Janeiro, October-November 1922. [Received 23rd February 1925.]

The Coccids, *Asterolecanium pustulans*, Ckll., and *Icerya purchasi*, Mask., attack *Grevillea robusta*, grown as an ornamental tree in Rio de Janeiro. *I. brasiliensis*, Hemp., and two Aleurodids infest *Moquile tomentosa*, while *Pachira aquatica* is attacked by two Coccids, *Pseudococcus pachira*, Hemp., and *P.* (*Dactylopius*) *setosus*, Hemp. Spraying with an emulsion of kerosene-soap is the measure advocated against them.

TORRES (A. F. M.). **Uma broca do tomateiro,** *Phyrdenus divergens* **(Germ.) Champ.**—*Bol. Minist. Agric., Ind., e Comm.*, xii, no. 2, pp. 38–46. Rio de Janeiro, April-June 1923. [Received 23rd February 1925.]

The Curculionid, *Phyrdenus divergens*, Germ., does considerable injury to tomatos in Brazil. The adult feeds on the shoots, fruits and leaves, and the larva mines the stem and branches. The eggs are laid on the stem, branches and foliage. Oviposition normally occurs from mid-September to mid-October, and may extend to November. No natural enemies have been noticed. When this weevil is observed in a plantation of tomatos, the adults should be collected and all infested branches removed and either burnt or buried about 18 inches deep, or placed in an insecticide solution. Crop rotation should be practised. Other pests of the tomato in Brazil are the bugs, *Corecoris fuscus*, Thunb., and *Eugytatus notatus*, Dist., the scales, *Orthezia insignis*, Dougl., and *Pulvinaria* sp., and the caterpillars of *Mechanitis lysimnia*, F., *Protoparce lucetius*, Stoll, *P. sexta*, Joh., *Heliothis* (*Chloridea*) *obsoleta*, F., and *Leucinodes elegantalis*, Guén.

Uma praga do cafeeiro.—*Bol. Minist. Agric. Ind. e Comm.*, xiii, no. 3, pp. 79–86. Rio de Janeiro, July 1924. [Received 23rd February 1925.]

This report on the coffee berry borer, *Stephanoderes* [*hampei*, Ferr.] in S. Paulo has already been noticed [*R.A.E.*, A, xii, 484, 501].

TORRES (A. F. M.). **Do historico e valor da defesa sanitaria vegetal.** [On the History and Value of the Brazilian Plant Protection Service.]—*Bol. Minist. Agric., Ind., e Comm.*, xiii, no. 4, pp. 73–87. Rio de Janeiro, August 1924. [Received 23rd February 1925.]

This is an account of the establishment, development and activities of the Brazilian plant protection service.

MOREIRA (C.). **Os percevejos capsideos do fumo no Brazil.** [The Tobacco Capsid Bugs in Brazil.]—*Bol. Minist. Agric., Ind., e Comm.*, xiii, no. 7, pp. 85–91, 4 figs. Rio de Janeiro, November-December 1924.

This paper has been noticed from another source [*R.A.E.*, A, xii, 65].

DE AZEVEDO (A.). **O** *Stephanoderes coffeae* **Hag. do café, o que se tem dito sobre o mesmo aqui na Bahia.** [*S. hampei*, Ferr., the Coffee Berry Borer. The Discussion about it in Bahia.]—*Correio-Agric.*, ii, no. 12, pp. 359–360. Bahia, December 1924.

The beetle borers of coffee hitherto found in the State of Bahia are the Anthribid, *Araecerus fasciculatus*, DeG., and a Scolytid, *Stephanoderes fallax*, Costa Lima [*R.A.E.*, A, xiii, 54], which is indigenous in Brazil. The coffee berry borer, *S. hampei*, Ferr. (*coffeae*, Hag.), which is ravaging coffee in the State of S. Paulo, is said not to exist in Bahia.

DE AZEVEDO (A.). **A lagarta " verde " do fumo.** [*Protoparce paphus*, the " green " Caterpillar of Tobacco.]—*Correio-Agric.*, ii, no. 12, pp. 361–363, 2 figs. Bahia, December 1924.

The Sphingid, *Protoparce paphus*, Cram., which is a severe pest of tobacco in Bahia, may be combated by spraying with 1 lb. Paris green and 5 lb. slaked lime in 100 gals. water. An alternative formula is 8 lb. lead arsenate and 10 lb. wheat flour in 100 gals. water. *Apanteles congregatus*, Say, and the Tachinid, *Belvosia bifasciata*, F., are valuable parasites of this pest.

Destrucción de la langosta " tucura." [The Destruction of the " Tucura " Locust.]—*Minist. Agric. de la Nación*, Circ. 373, 3 pp., 1 fig. Buenos Aires, 30th January 1925.

The "tucura" locust has now been declared a pest under the Argentine Law no. 3708. It is as dangerous as *Schistocerca paranensis*. The adults oviposit in autumn, and with the first hot days the larvae hatch and begin feeding on the tender vegetation. Within 40 days development is completed to the adult stage, which gives rise to a second generation. If the cold weather is delayed, a third generation may occur. The best preventive measure consists in ploughing early in winter in the places where the eggs have been laid, and then harrowing the soil so as to expose them. A poison-bait containing arsenic and flavoured with oranges is recommended, or the Criddle mixture may be used.

BERTONI (A. de W.). **El *Salpingogaster* destructor del Pulgon del Algodonero.** [*Salpingogaster* Destroyer of *Aphis gossypii*.]—*Rev. Soc. cient. Paraguay*, i, no. 6, pp. 90–91. Asunción, October 1924.

In an outbreak of *Aphis gossypii*, Glover, in Paraguay in November and December 1923, large numbers were destroyed by the Syrphid, *Salpingogaster nigriventris*, Big.

BERTONI (A. de W.). **Sobre el Marandova de la mandioca (*Erinnyis ello* L.).** [Notes on the Larva of *E. ello*.]—*Rev. Soc. cient. Paraguay*, i, no. 6, p. 91. Asunción, October 1924.

Erinnyis ello, L., is a sporadic pest in Paraguay, where it completely defoliates cassava plants. During an outbreak of this moth in 1922, 80 per cent. of the pupae were destroyed by a Dipterous parasite. It is easily combated by means of Paris green or calcium arsenate, and hand-picking of the larvae and pupae.

BERTONI (A. de W.). **El *Oeketicus kirbyi* Guild. o " canasto " en el Paraguay.** [*Oeceticus kirbyi* in Paraguay.]—*Rev. Soc. cient. Paraguay*, i, no. 6, pp. 91–92. Asunción, October 1924.

Oeceticus kirbyi, Guild., var. *platensis*, Berg, is a pest of fruit and other trees in the temperate zone of Argentina, but generally only scattered individuals are seen in Paraguay. Alarming numbers of the moth were, however, observed by the author on one occasion in Villa Hayes under an apple tree, many of the larvae being parasitised. Useful parasites of the larvae are the Tachinid, *Parexorista caridei*, Brèth., and the Hymenoptera, *Spilochalcis bergi*, Kirby, *Pimpla*

oeceticola, Brèth., *P. tomyris*, Schr., *Allocota bruchi*, Br., *Phobetes bruchi*, Br., *Tetrastichus platensis*, Br., *Eurytoma caridei*, Br., and *Perissocentrus argentinae*, Crawf.

Bertoni (A. de W.). **Sobre Coleopteros que merecen ser considerados plagas de la Agricultura.** [Coleoptera that may be considered Pests of Agriculture.]—*Rev. Soc. cient. Paraguay*, i, no. 6, pp. 92–93. Asunción, October 1924.

The South American beetles briefly noticed in this paper are *Collabismodes* (*Collabismus*) *cluniferus*, Boh., attacking tobacco; *Derosimus quadricollis*, Fairm., damaging oranges; *Pachymerus bactris*, L., destructive to palms of the genus *Euterpe*; *Colaspoides mera*, Germ., eating the leaves of cotton; *Pnethes instabilis*, Lac., destructive to rose-trees; *Oncideres fasciatus*, Lucas, a pest of avocado (*Persea gratissima*); *Rutela lineola*, L., and *Pelidnota unicolor*, Dru., harmful to beans; and *Enema pan*, F., *E. infundibulum*, Burm., and *Strategus tridens*, Reiche, pests of small palms.

Bertoni (A. de W.). **Avispas que comen** *Icerya*. [Wasps that eat *Icerya*.]—*Rev. Soc. cient. Paraguay*, i, no. 6, p. 93. Asunción, October 1924.

Polistes cavapyta, Sauss., and *P. canadensis*, L., are recorded as greedily devouring *Icerya brasiliensis*, Hempel, in Paraguay.

Los últimos informes sobre la invasión de la langosta. [The latest Reports on the Locust Invasion in Uruguay.]—*Uruguay: Minist. Indust., Defensa Agricola, Bol. Mens.*, v, no. 11–12, pp. 163–165. Montevideo, November-December 1924.

The invasion of Uruguay by locusts is now complete except for one district [*R.A.E.*, A, xii, 549].

Friederichs (K.). **Eine Käferplage der Kaffeepflanzungen in Niederländisch-Ostindien.** [A Beetle Pest in the Coffee Plantations of the Dutch East Indies.]—*Der Tropenpflanzer*, xxviii, no. 1, pp. 26–33. Berlin, January-February 1925.

This is a review of the occurrence of the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.) in the Dutch East Indies, and of the measures adopted against it.

Wilke (S.). **Der Rüsselkäfer** *Herpisticus eremita* **Ol., ein Rebschädling auf Tenerife.** [The Weevil, *H. eremita*, a Vine Pest in Teneriffe.]—*Der Tropenpflanzer*, xxviii, no. 1, pp. 33–35, 2 figs. Berlin, January-February 1925.

The Curculionid, *Herpisticus eremita*, Ol., belonging to a genus peculiar to the Canary Islands, was noticed in 1924 in Teneriffe defoliating vine-stocks after the vintage. Its behaviour seems to resemble that of *Otiorrhynchus* spp. on vines in Germany, for though the chief injury done by the latter is the attack on the subterranean parts by the larvae, the adults do attack the buds and the leaves in spring. Collection of the weevils does not seem a promising measure, and spraying is advocated.

GRANDI (G.). **Agaonini e Sycophagini olartici e indo-malesi. 17° Contributo alla conoscenza degli Insetti dei Fichi.** [Holarctic and Indo-Malayan Agaoninae and Sycophaginae. Seventeenth Contribution to the Knowledge of Fig Insects.]—*Boll. Lab. Zool. gen. & agrar. R. Scuola sup. Agric.*, xviii, pp. 3–31, 11 figs. Portici, 1924.

This is the full text of a paper already noticed from a preliminary résumé [*R.A.E.*, A, xii, 44].

GRANDI (G.). **Biologia, morfologia e adattamento negli insetti dei fichi. (20° contributo alla loro conoscenza.)** [The Biology, Morphology and Adaptation of Fig Insects. 20th Contribution to a Knowledge of them.]—*Atti Soc. ital. Sci. nat.*, lxiii, pp. 288–311. Pavia ?, 1925.

The title of this paper indicates its contents, which are complementary to those of another paper already noticed [*R.A.E.*, A, xi, 272].

DINGLER (M.). **Rüsselkäferstudien. I. Die Generation des** *Hylobius abietis* **L.** [Studies on Weevils. I. The Generations of *H. abietis*, L.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 1–22, 1 pl. Berlin, February 1925.

The conclusions reached in this report of observations on the number of annual generations of *Hylobius abietis*, L., have already been noticed from a preliminary paper [*R.A.E.*, A, xiii, 63].

BAER (W.). **Die Parasiten der Kieferneule.** [The Parasites of the Pine Moth.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 23–34. Berlin, February 1925.

The author points out that the lists of parasites given by Wolff and Krausse in their textbook *Die forstlichen Lepidopteren* [*R.A.E.*, A, x, 570] contain many names that are synonyms, and that many insects are included the parasitic status of which is doubtful. The list of parasites of the pine moth [*Panolis flammea*] includes 112 names, which can, by throwing out the synonyms, be reduced to 68, a number that can be further reduced to 17 if only such species as are of more or less economic importance are recorded. A list is given here of the 68 species, divided into groups according to their economic importance.

VON PFETTEN (J.). **Beiträge zur Kenntnis der Fauna der Waldstreu. Fichtenstreu-Untersuchungen.** [Contributions to the Knowledge of the Fauna of Forest Floors. Investigations of Spruce Litter.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp 35–54. Berlin, February 1925.

The fauna found in litter in spruce forests is enumerated in a series of lists [*cf. R.A.E.*, A, xiii, 103].

PRELL (H.). **Die Biologie von** *Cryptocephalus pini*, **L.**—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 55–62. Berlin, February 1925.

Cryptocephalus pini, L., sometimes occurs in abundance and is then of some importance as a pest of pine needles. It may also be found on silver fir [*Abies pectinata*] and spruce. In July 1923 the author collected on pine stems pupae that gave rise to adults during the first

fortnight in August, whereas other beetles of the same genus, such as *C. flavipes*, F., appear earlier in the year. It is probable that the larvae of *C. pini* climb the trunks to pupate about one month before the emergence of the adults. The pupae were taken beneath bands about 4 feet up the trunks ; the larvae presumably live in the ground, though it is not known what they feed on.

MENZEL (R.). **Ueber Teeschädlinge in Niederländisch-Indien und ihre Bekämpfung. II. Ueber ein schädliches Massenauftreten von *Phytorus dilatatus* Jac. (Chrysomel. Eumolp.).** [Tea Pests in the Dutch East Indies and their Control. II. An injurious Outbreak of *P. dilatatus*.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 63–76, 10 figs. Berlin, February 1925.

The Eumolpid, *Phytorus dilatatus*, Jac., has been recorded since 1921 as a tea pest of some importance in the Dutch East Indies [*R.A.E.*, A, x, 176 ; xi, 89, 563]. A variety of wild and cultivated plants may also be attacked, including cassava (*Manihot utilissima*), *Ricinus* and cacao. The original habitat of *P. dilatatus* appears to be the virgin forests. It eats holes in the leaves of tea, causing them to wither and fall ; it also attacks the leaf-stalks and young twigs. In the case of a severe outbreak as many as 20–30 individuals may occur on one leaf. If disturbed they drop to the ground. Feeding is most active at night, and it is chiefly at night that the adults fly to neighbouring areas and thus spread the infestation. Collection of the adults should be practised, and a specially constructed funnel-shaped bag for the purpose is described and illustrated.

P. dilatatus lays its eggs in batches. In captivity they were laid on leaf-stalks and the chief leaf-nervures, and this probably occurs in nature also. Incubation takes 9–10 days. The mature larvae migrate to the ground and probably pupate there. The total time of development from egg to adult must require 1½–2 months. The adults live 2 4 weeks. A Tachinid, *Phytorophaga ventralis*, Bezzi, appears to be a regular parasite of the adults, but it seems to account for a small percentage only. A Gregarine, *Gregarina munieri* (?), has been observed in the intestine of dead adults, but whether it was the cause of death was not ascertainable.

JABLONOWSKI (J.). **Ist der Getreideschmalkäfer, *Silvanus surinamensis* L. ein Getreideschädling ?** [Is *S. surinamensis* a Pest of Corn ?]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 77–112, 3 figs. Berlin, February 1925.

The grain-beetle, *Silvanus surinamensis*, L., is regarded in America as being injurious, even very injurious, and most European text-books adopt the same view. From some 20 years' observations and experiments in Hungary, however, the author concludes that *S. surinamensis* is not a true grain pest. It is found in grain warehouses, and lives in stored grain when infested by a real pest which, in Hungary, is chiefly *Calandra granaria*, L. Its food is not sound, dry grain, but chiefly the débris resulting from the feeding of the actual pest, provided that the débris contains a certain degree of moisture. Stored grain that is sound and dry does not provide food for *S. surinamensis* in any stage. It is uncertain whether damp (such as would cause decomposition) would encourage *S. surinamensis* in the absence of a true pest. This beetle is not carnivorous and does not appear to eat the dead bodies of *C. granaria*. It is very long-lived, both in the larval and adult stages,

and it is possible that parents may breed again at the same time that their early progeny are breeding, thus accounting for the fact that it may occur in enormous numbers. In Hungary control measures should therefore be directed against *C. granaria*, by storing grain in a dry, well-lighted and well-ventilated warehouse built of ferro-concrete. Poisons, fumigants, etc., are considered superfluous.

KLEINE (R.). **Beschädigung des Hafers durch Thysanopteren.** [The Injury to Oats by Thysanoptera.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 113–131. Berlin, February 1925.

An experiment with 67 different varieties of oats to ascertain whether differences in the development of the plants had any influence on infestation by thrips had negative results; and weather conditions did not appear to be a factor.

SPEYER (W.). *Perilitus melanopus* **Ruthe (Hym. Braconidae) als Imaginalparasit von** *Ceutorrhynchus quadridens* **Panz. Zugleich eine kurze Zusammenfassung unserer bisherigen Kenntnisse von Schlupfwespen als Parasiten der Käfer-Imagines.** [*P. melanopus* as a Parasite of the Adult of *Ceuthorrhynchus quadridens*. Also a brief Résumé of our existing Knowledge of Hymenopterous Parasites of Adult Beetles.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 132–146, 3 figs. Berlin, February 1925.

The first part of this paper deals very briefly with the parasitisation of adult beetles. Hymenopterous parasites seem limited to the Braconids, and a table is given showing the species concerned, their hosts, the names of the recorders and the date and place of the records.

The second part is devoted to the author's observations of the Braconid, *Perilitus melanopus*, Ruthe, as a parasite of *Ceuthorrhynchus quadridens*, Panz., which is a serious pest of cultivated Cruciferae in Germany [*R.A.E.*, A, x, 145]. Although as many as 19 per cent. of the female weevils were found to be parasitised in 1921, this did not influence their numbers to any great extent, because parasitised females can continue reproduction for a long time. The biology of *P. melanopus* is still obscure in many particulars.

RŮŽIČKA (J.). **Das Verhalten der Vögel zur Nonne in Böhmen und Mähren im Zeitraume 1888-1924.** [The Behaviour of Birds to the Nun Moth in Bohemia and Moravia in the Period 1888–1924.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 147–148. Berlin, February 1925.

The experience of foresters in Bohemia and Moravia is opposed to the favourable view of the value of birds as destroyers of insect pests taken by von Vietinghoff [*R.A.E.*, A, xii, 574]. In general, birds have proved more harmful than otherwise in the course of the various outbreaks of the nun moth [*Lymantria monacha*] owing to their destroying beneficial insects, and a revision of existing lists so as to include only the predominantly useful species seems necessary.

BLUNCK (H.). **Parasiten der Elateridlarven.** [Parasites of Elaterid Larvae.]—*Zeitschr. angew. Ent.*, xi, no. 1, pp. 148–149. Berlin, February 1925.

Referring to Zolk's papers on the parasitisation of the larvae of the Elaterid, *Agriotes obscurus*, L., by *Paracodrus apterogynus*, Halid.

[*R.A.E.*, A, xii, 434 ; xiii, 68], the author states that in 1922 he obtained this Proctotrupid from *A. sputator*, L., in Germany. He also gives references to a number of existing records of the parasitisation of Elaterid larvae, from which it is clear that further investigation on the subject is desirable.

ESCHERICH (K.). **Aufgaben der Forstentomologie.** [The Tasks of Forest Entomology.]—*Allg. Forst.- u. Jagdzeitung*, January 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 157. Berlin, February 1925.)

Though much is now known about the insect pests of forestry and the forms of injury done by them, forest entomologists have still to determine the causes of outbreaks and the methods for preventing or checking them. It is necessary to encourage those natural factors that maintain the balance of nature and that have been interfered with by modern methods of forestry.

KLIMESCH (J.). **Fangbäume-Fangschläge.** [Trap Trees and Trap Fellings.]—*Wiener Allg. Forst.- u. Jagdzeitung*, xli, nos. 28 & 31, 1923. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 162. Berlin, February 1925.)

This is a survey of the various methods used against *Ips typographus*, L., which is the most important pest of spruce in Austria. The various forms of trap trees are discussed. The Sedlaczek system of leaving the trunks standing has not proved satisfactory. Not only must trap trees have certain qualities, but they must be sufficiently numerous, and a formula worked out by Seitner for gauging the importance of an increase of the beetle may be made use of for ascertaining the requisite number of trap-logs. The second part of the paper deals with new and as yet incompletely tested methods, especially biological control. The Chalcid, *Rhopalicus suspensus*, Ratz., seems well suited for this purpose. Trap felling, which is really a large-scale development of the use of trap logs, is also discussed.

SEITNER (M.). **Beobachtungen und Erfahrungen aus dem Auftreten des achtzähnigen Fichtenborkenkäfers** *Ips typographus* **L. in Oberösterreich und Steiermark in den Jahren 1921 und 1922. 2. Verlauf der Generationen in den Jahren 1921 und 1922 im Forstwissenschaftsbezirke Reichraming. 3. Die Ueberwinterung des Käfers. 4. Die Bekämpfung des achtzähnigen Fichtenborkenkäfers bei vorherrschend primären Auftreten.** [Observations and Experiences from the Occurrence of *I. typographus* in Upper Austria and Styria in 1921 and 1922. 2. The Course of the Generations in 1921 and 1922 in the Forestry District of Reichraming. 3. The Hibernation of the Beetle. 4. The Control of *I. typographus* in the case of a predominating primary Infestation.]—*Zentralbl. ges. Forstw.*, xlix, nos. 4–6 & 10–12, 1923. (Abstracts in *Zeitschr. angew. Ent.*, xi, no. 1, pp. 162–164. Berlin, February 1925.)

The first part of this series of communications on *Ips typographus*, L., has already been noticed [*R.A.E.*, A, xii, 297].

This species is one of the bark-beetles that have 1 or 2 generations a year, according to temperature and atmospheric humidity. By providing both to an optimum degree in thermostats, Hennings obtained 12 generations in 12 months. It is the young adults that are specially susceptible to weather influences, and it is through the behaviour of the beetle in this stage that the duration of a generation is prolonged by unfavourable weather. According to Hennings, only 27 per cent. of the old adults produce a second brood. Though he does not, therefore, assign much importance to such breeding, even 20 per cent. of re-breeding beetles may be an important factor; though the sexes are equally divided, the beetles may pair more than once.

As regards hibernation it is found that the places from which the young adults emerge in autumn are also their normal winter quarters. The mature adults, on the other hand, seek such lower parts of the trunks as have not been attacked by the first swarm. It is doubtful whether ground litter is a winter refuge.

SEITNER (M.). **Beobachtungen und Erfahrungen aus dem Auftreten des achtzähnigen Fichtenborkenkäfers** *Ips typographus* **L. in Oberösterreich und Steiermark in den Jahren 1921 bis einschliesslich 1923. 5. Parasiten und Räuber.** [Observations and Experiences from the Occurrence of *I. typographus* in Upper Austria and Styria in the Years 1921 to 1923 inclusive. 5. Parasites and Predacious Enemies.]—*Zentralbl. ges. Forstw.*, 1, no. 1–3, 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 164. Berlin, February 1925.)

Ruschka's descriptions of the parasites and predacious enemies of *Ips typographus*, L., are given, with notes on their life-history. The Chalcid, *Eutelus typographi*, Ruschka, has been found to be an external parasite of the larva of *Ipocoelius seitneri*, Ruschka, and is thus a hyperparasite of *I. typographus*.

FREIBERGER (—). **Zur Maikäferfrage.** [On the May Beetle Question.] —*Allg. Forst.- u. Jagdztg.*, c, April 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, pp. 165–166. Berlin, February 1925.)

These observations were made in Baden, in a district almost exclusively planted with pines; *Melolontha hippocastani* was the species concerned, *M. melolontha* (*vulgaris*) occurring on the edges only. Particularly heavy injury by the larvae had been expected in 1923, but it proved to be surprisingly slight, because larval feeding stopped in May instead of continuing until the end of July. It was found that *M. hippocastani* oviposits in the ground and that few eggs are laid in cleared areas, their number decreasing as such ground runs wild. Furthermore, oviposition is less abundant in fully-stocked woods than in open woods. It is therefore possible to reduce reproduction and consequent larval injury by keeping the stands fully stocked and by quickly re-stocking stands that have been thinned. The reproduction of *M. hippocastani* is also influenced by the method of regeneration; of the three methods—clear-cutting, gap-felling and thinning—there is a slight advantage in favour of the first. Investigations of seedlings and yearling plants showed that the maximum injury resulted where the 3rd-year larvae coincided with the three-year-old plants.

WICHMANN (H. E.). **Die forstliche Bedeutung der Schnellkäferlarven.** [The Importance of Elaterid Larvae in Forests.]—*Wiener Allg. Forst.- u. Jagdztg.*, xlii, no. 42, Vienna, 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 167. Berlin, February 1925.)

The pupae of *Agria affinis* and *Parasetigena segregata*, both of which are important parasites of the nun moth [*Lymantria monacha*], are destroyed by larvae of *Corymbites* and *Lacon*. The percentages of pupae destroyed were 11·4 for *A. affinis* and 10·5 for *P. segregata*, this being counterbalanced to some extent by the fact that 8 per cent. of such pupae were already attacked by the hyperparasite, *Anthrax morio*.

HOHLFELD (—). **Einige weitere Worte zur Nonnenbekämpfung.** [Some further Remarks on Measures against the Nun Moth.]—*Forstl. Wochenschr. Silva*, xii, no. 27, 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 172. Berlin, February 1925.)

Banding is stated to be the most important measure against the nun moth [*Lymantria monacha*], even if only partly satisfactory results are achieved by it. The width of the coating is of more importance than its thickness. It is worth while to band trees even when already heavily infested. Collection of the eggs is of value as a remedial measure. In efforts to isolate woods it must be remembered that the majority of the caterpillars are spread by the wind and not by their own migration. A spray of 3 per cent. fruit-tree carbolineum is useful against young larvae infesting nurseries.

HILF (—) & WITTICH (—). **Grundsätze für die Auswertung und Handhabung der Forleulenprobesammlungen.** [Principles for the Utilisation and Manipulation of Sample Collections of *Panolis flammea*.]—*Forstl. Wochenschr. Silva*, xii, no. 35, 1924.

STUBENRAUCH (—). **Forstliche Plauderei. II. Kalamitäten im Kiefernwalde.** [Forestry Chats. II. Insect Outbreaks in Pine Forests.]—*Zeitschr. f. Forst- u. Jagdw.*, lvi, no. 9, 1924.

HILF (—) & WITTICH (—). **Zur Frage der Ausführung der Forleulenprobesammlungen.** [On the Question of Making Sample Collections of the Pine Moth.]—*Zeitschr. f. Forst- u. Jagdw.*, lvi, no. 12, 1924. (Abstracts in *Zeitschr. angew. Ent.*, xi, no. 1, p. 174. Berlin, February 1925.)

In the case of the pine moth, *Panolis* [*flammea*], the value and reliability of sample collections of the pupae have been disputed. New investigations in the forestry district of Biesenthal have, however, shown that such collections have a real diagnostic value provided that certain factors are scrupulously considered. The time of collection is specially important, and in August the result may be quite different from that obtainable in November. The earlier a collection is made the less is it to be depended upon. The diagnosis must be based on all available biological factors, and the choice of the forest strips for the purpose of collection must be very carefully made.

Badoux (H.). **Apparition du Bombyce disparate dans un taillis de châtaignier au Tessin.**—*Jl. For. Suisse*, 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 175. Berlin, February 1925.)

In 1924 an outbreak of *Porthetria dispar* occurred on chestnuts in the Swiss canton of Tessin. The trees were defoliated, but owing to their powers of resistance and to the effective action of parasites no considerable injury is expected to result in 1925.

Eckstein (K.). **Gelbe Nadeln der Kiefer.** [Yellow Needles of the Pine.]—*Forstl. Wochenschr. Silva*, xi, no. 47, 1923. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 175. Berlin, February 1925.)

Yellowing of the needles of old and young pines is caused by the larval feeding of the pine midge, *Thecodiplosis* (*Diplosis*) *brachyntera*, Schwäg.; of which the life-history is briefly described.

Barbey (A.). **Un lophyre ravageur du pin cembro (arolle).**—*Jl. For. Suisse*, lxxv, no. 10, 1924. (Abstract in *Zeitschr. angew. Ent.*, xi, no. 1, p. 177. Berlin, February 1925.)

In 1924 *Pinus cembra*, the dominant conifer in the High Alpine region, was found to be attacked by the sawfly, *Diprion* (*Lophyrus*) *simile*, Htg. In the Canton of Vaud, at an altitude of about 4,000 feet, 20-year-old trees from 9 to 15 feet high were injured.

Destructive Insect and Pest, England. Colorado Beetle Order of 1924. *Statutory Rules & Orders*, 1924, no. 1470, 1 p. London, 1925.

To prevent the introduction of the Colorado beetle [*Leptinotarsa decemlineata*, Say], no potatoes grown in the United States may be landed in England or Wales.

Imms (A. D.). **The Gout Fly of Barley.**—*Jl. Minist. Agric.*, xxxi, no. 12, pp. 1137–1140, 2 pls., 1 fig. London, March 1925.

This paper summarises the main conclusions drawn from work on *Chlorops taeniopus*, Mg., previously noticed [*R.A.E.*, A, xii, 474].

Baer (W.). **Biologische Beobachtungen an Kleidermotten.** [Biological Observations on Clothes Moths.]—*Naturw. Korrespondenz*, ii, no. 7–8, pp. 122–123, 1 fig. 1924. [Received 19th March 1925.]

The clothes moth, *Tineola biselliella*, Hummel, was recorded in 1886 by Sorhagen as attacking groats. A further instance of this is noted here, and it was found experimentally that either feathers or groats were eaten indifferently. That the clothes moth must have originally fed on other material than furs and woollen fabrics is indicated by the fact that *Trichophaga tapetzella*, L., has been taken from the casts, usually consisting of mouse hairs, ejected by birds of prey, especially owls.

Prell (H.). **Forstschädliche Laufkäfer (I.).** [Carabid Beetles injurious in Forestry (I.).]—*Forstw. Centralbl.*, xlvii, pp. 67–73, 4 figs. Berlin, 1925.

Carabids are generally regarded as useful, with a few exceptions, such as *Zabrus tenebrioides*, Goeze, but there are records of injury

by them to germinating seed in forest nurseries. A laboratory investigation made in 1924 leads to the conclusion that the genera *Amara, Harpalus, Pseudophonus, Poecilus, Calathus* and *Bembidion* must be regarded as injurious to forestry, and the genus *Omaseus* probably belongs to this class. Whether the injury done by the beetles to seed is balanced by their beneficial action as destroyers of other insects is a matter that requires determination in each individual case.

PRELL (H.). **Ueber eine "fremddienliche Zweckmässigkeit" bei Insekten und ihre kausale Analyse.** [On an Adaptation in some Insects which is favourable to others and an Examination of its Cause.]—*Biol. Zentralbl.*, xliii, no. 3, pp. 432–439. Leipzig, 31st July 1923.

The larvae of *Lophyrus frutetorum*, F., parasitised by *Ceromasia* (*Lophyromyia*) *inclusa*, Hart., make abnormal cocoons, and it is this that enables the fly to emerge. This has been regarded by some authors as a peculiar case of adaptation, when the host acts in a way directly useful to its parasite, but the author's observations have convinced him that the abnormal structure of parasitised cocoons is a direct result of the mechanical checking of the spinning ability of the host by the parasite.

PRELL (H.). **Rossameisen** (*Camponotus*) **als Eichentriebschneider.** [*Camponotus* damaging Oak Shoots.]—*Forstl. Wochenschr. Silva*, 1924, no. 26, reprint, 2 pp. Tübingen, 1924. [Received 19th March 1925.]

The ant, *Camponotus herculeanus*, L., has been observed in Germany to cut the May shoots of oaks so that they are bent and wither. As the resultant injury is considerable, it is advisable to uproot the tree stumps that afford shelter to the colonies of this ant. Only oaks appear to be attacked.

PRELL (H.). **Zur Biologie der Blattschaber (Cionini). II. Der Entwicklungsgang des Eschenblattschabers.** [On the Biology of the Leaf-scraping Beetles (Cioninae). II. The Development of the Ash Leaf-scraper.]—*Forstl. Wochenschr. Silva*, 1925, no. 5, reprint, 6 pp. Tübingen, 1925.

In Saxony in 1924 the first traces of injury to ash trees by *Cionus fraxini*, DeG., occurred in June, when the first larvae and adults were seen. Pupation occurred about mid-July. There was no second brood, though it had been supposed that there is more than one generation of this weevil in Germany. Pupation takes place chiefly on the infested leaves, but many larvae probably pupate on the ground. *C. tuberculosus*, Scop., was even more numerous on ash in June, and *C. scrophulariae*, L., and *C. alauda*, Hbst., also occurred.

PRELL (H.). **Ameisen als Schutz gegen Raupenfrass.** [Ants as a Protection against Feeding by Caterpillars.]—*Forstl. Wochenschr. Silva*, 1925, no. 7, reprint, 16 pp. Tübingen, 1925.

A German forester, Schulz, found that an ordinary colony of ants comprising some 75,000 individuals can protect about 2½ acres of forest against infestation by caterpillars, such as those of the nun and pine

moths [*Lymantria monacha* and *Panolis flammea*]. He established 340 colonies in an area of about 1,200 acres, the method employed being to empty a bucketful of ants' nest material containing the pupae on the tree stump that is to serve as the new nest, the stump having been wetted with a solution of 1 lb. sugar in 4½ gals. water.

The author points out that *Formica rufa*, L., the species used, is the only one suitable for this purpose. It must, however, be remembered that an increase of ants involves an increase of Aphids. Furthermore, banding must not be practised if the ants are to be useful, and at present it seems inadvisable to give up the direct protection afforded by banding for the indirect one given by ants.

TSCHUDI (A.). *Xylococcus filifer*, **eine wenig bekannte Schidlaus auf** *Tilia*. [*X. filifer*, a little-known Scale on the Lime.]—*Schweiz. Zeitschr. Forstw.*, lxxv, pp. 253–257. 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes*, 1924, no. 4, p. 15. Vienna, 1924.)

In the Swiss canton of Glarus the scale, *Xylococcus filifer*, attacks *Tilia cordata* and *T. parvifolia*, but it is only in the case of a severe infestation that the tips of the branches are killed.

BUSSE (—). **Ein bisher wenig beachteter Schädling des Douglasiensamens.** [A hitherto little regarded Pest of Douglas Fir Seed.]—*Deutsche Forstzeitg.*, xxxix, p. 559, 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes*, 1924, no. 4, p. 16. Vienna, 1924.)

The larva of the Chalcid, *Megastigmus spermotrophus*, Wachtl, infests the seeds of Douglas fir [*Pseudotsuga taxifolia*], and was originally introduced into Europe from America in imported seed. Up to 22 per cent. of the seed is infested, and all seed should be exposed to a moderate heat in winter to kill the developing adults.

REICHELT (K.). **Der Erbsenblattrandkäfer** *Sitones lineatus*. [The Pea Leaf Beetle, *Sitona lineata*.]—*Die Gartenwelt*, xxviii, pp. 136–137, 1 fig., 1924. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes*, 1924, no. 4, p. 18. Vienna, 1924.)

In the neighbourhood of Poppelsburg *Sitona* (*Sitones*) *lineata* is a serious pest of peas, the injury being more marked when the early development of the plant occurs in warm, dry weather. The blossoms are destroyed under such conditions. Beans suffer to a less extent. Repeated rolling (which does not affect young pea plants 4–6 inches high), hoeing and the use of saltpetre are the measures advocated against this weevil.

MEYER (R.). **Beobachtungen über** *Meligethes aeneus*, **den Rapsglanzkäfer, im Jahre 1923.** [Observations on *M. aeneus* in 1923.]—*Arch. Naturg.*, Abt. A, xc (1924), no. 8, pp. 175–189, 1 fig. Berlin, February 1925.

The results obtained from exhaustive observations on *Meligethes aeneus* in Germany during 1923 show that the beetle itself causes comparatively little damage to the plants, such as colza, rape, kohlrabi,

white mustard and radishes. The larva is, however, extremely destructive to young buds, flower stalks and young fruit, more damage being done in dry weather than in wet.

STELLWAAG (F.). **Die Fauna tiefer Weinkeller.** [The Fauna of deep-lying Wine Cellars.]—*Arch. Naturg.*, Abt. A, xc (1924), no. 8, pp. 130–149. Berlin, February 1925.

This article has been noticed from another source [*R.A.E.*, A, xii, 292].

RENSCH (B.). **Zwei quantitative reizphysiologische Untersuchungsmethoden für Rübennematoden.** [Two quantitative Methods of Investigation of Physiological Stimuli for Root Nematodes.]—*Zeitschr. wiss. Zool.*, cxxiii, no. 3–4, pp. 488–497, 2 figs. Leipzig, 30th December 1924.

The author's experiments aimed at finding methods of control of *Heterodera schachtii*, Schm., based on the physiological reactions of the pest to certain factors of environment. Observations on the emergence of Nematode larvae from their cysts showed that the rate of emergence, under the same temperature conditions, depends on the chemical composition of their immediate environment, that is, of the secretion of turnip roots. Experiments with the action of various chemical substances, constituents of the secretion of roots attacked by Nematodes, proved that the Nematodes respond very differently to different chemicals, and the rate of emergence may be expressed graphically and numerically, thus giving a possibility of a quantitative study of reactions. An outline of the technique used is described, but the actual results are to be published later [*cf. R.A.E.*, A, xiii, 102]. The practical suggestion made as to the control of Nematodes is to introduce into the soil the substance that is found to stimulate in the highest degree the emergence of the larvae, immediately after the turnips have been harvested. This would bring all larvae resting in the soil out of their cysts and cause their destruction, since there would be no young roots on which they could feed.

In the second part of the paper a method is described of studying the reactions of Nematodes to chemical substances in Petri glasses.

BÖRNER (C.) & THIEM (H.). **Ueber die Natur neuzeitlicher Reblausbekämpfungsmittel.** [On the Nature of Modern Remedies against the Vine *Phylloxera*.]—*Arb. biol. Reichsanst. Land- u. Forstw.*, xiii, no. 4, pp. 419–422. Berlin, February 1925.

The idea underlying the preparation of the various modern remedies against *Phylloxera* is that of counteracting the injurious effect of carbon bisulphide on the vines by adding to it substances that regulate its action so as to decrease such injury and promote its insecticidal qualities. It may be supposed that a slowly-evaporating body that affects the insects more than the plant, would enhance the effect of the carbon bisulphide, but on the other hand a body that has no property other than that of modifying the physical behaviour of carbon bisulphide may prove quite useful. Such a mixture is one containing carbon bisulphide and fish-oil. This preparation gave

very marked results as regards retarding the evaporation of carbon bisulphide, but all mixtures of carbon bisulphide with heavy oils have a similar effect.

THIEM (H.). **Die Prüfung von Mitteln zur direkten Bekämpfung der Reblaus.** [The Testing of Remedies for the direct Control of *Phylloxera*.]—*Arb. biol. Reichsanst. Land- u. Forstw.*, xiii, no. 4, pp. 423–431. Berlin, February 1925.

While grafting appears to be the ultimate solution of the problem of dealing with *Phylloxera*, chemical methods will enable the transition to the general use of grafted vines to be accomplished in an ordered manner. This paper discusses the characters required in the chemicals and the methods that should be employed in testing them.

CLERMONT (J.). **Dégâts de l'*Otiorrhynchus crataegi* Germ. (Col. Curculionidae).**—*Bull. Soc. ent. France*, 1925, no. 1, p. 11. Paris, 1925.

Otiorrhynchus crataegi, Germ., is recorded from Austria as attacking lilac.

VAN POETEREN (N.). **Verslag over de Werkzaamheden van den Plantenziektenkundigen Dienst in het Jaar 1923.** [Report on the Work of the Phytopathological Service in the Year 1923.]—*Verslag. & Meded. Plantenziektenk. Dienst*, no. 34, 66 pp., 3 pls. Wageningen, October 1924. [Received 23rd March 1925.]

Injury to oats by *Heterodera schachtii*, Schm., was common, and, in one case, another Nematode, *Tylenchus dipsaci*, Kühn (*devastatrix*, Kühn), seemed to delay growth. Rye was attacked by the rose-beetle, *Phyllopertha horticola*, L., and the larvae of a species of *Bibio* injured the roots. Against *Oscinella* (*Oscinis*) *frit*, L., good results were obtained by sowing rye in November, by which month most of the larvae have pupated. Peas were attacked by leaf-rolling caterpillars, identified as *Cnephasia wahlbomiana*, L. Pastures were infested with Curculionid larvae, and though *Phyllobius pyri*, L., was present, it is not certain whether this or other weevils caused the damage. Another beetle, *Hoplia philanthus*, Füssl., was also injurious to grass.

Cauliflowers were injured by the larvae of a beetle of the genus *Baris*, and beans were attacked by the lupin fly, *Phorbia* (*Anthomyia*) *cilicrura*, Rond. Both the leaves and fruits of cucumber were injured by the Staphylinid beetle, *Trogophloeus bilineatus*, Steph.

Ferns (*Adiantum*) were attacked by the larvae of *Sciara* sp., and a mite, *Tenuipalpus* sp., infested *Phoenix* palms. The bulbs of *Iris* were injured by Coleopterous larvae, probably the flea-beetle, *Aphthona coerulea*, Foucr. Crocus bulbs were damaged to some extent by the larvae of *Anomala aenea*, Frisch. Bulbs of *Galanthus nivalis* (snowdrop) harboured maggots of the narcissus fly, *Merodon equestris*, F., and *Narcissus* was badly injured by mites, *Bryobia praetiosa*, Koch.

Raspberry bushes were infested by a gall-mite, almost certainly *Eriophyes gracilis*, Nal., and it was remarkable that the hibernating individuals were not killed by a spray of 7 per cent. carbolineum,

even though in accessible situations. Pear seed, probably of Hungarian origin, was infested by the Chalcid, *Syntomaspis druparum*, Boh.

Seed of Douglas fir [*Pseudotsuga taxifolia*] was infested by the Chalcid, *Megastigmus spermotrophus*, Wachtl, which may be got rid of by exposure to dry heat of 50°–52° C. [122°–125·6° F.]. The larvae of *Trogoderma granarium*, Everts, attacked barley in a brewery. Osier willows were mined by the larvae of a fly, *Dizygomyza carbonaria*, Zett., from the pupae of which the Braconid, *Apanteles fulvipes*, Hal., was bred. Spraying proved useless against the leaf-roller, *Tortrix* (*Cacoecia*) *rosana*, L., which was a pest of greenhouse plums and peaches [*R.A.E.*, A, xii, 183], and collection of the caterpillars and egg-masses is the only remedy available.

VAN POETEREN (N.). **De Plantenziektenkundige Dienst in Nederland.** [The Plant Diseases Service in Holland.]—*Verslag. & Meded. Plantenziektenk. Dienst*, no. 36, 73 pp., 10 figs., 1 map. Wageningen, November 1924. [Received 23rd March 1925.]

This is an account of the establishment (in 1899), development and activities of the Dutch Plant Protection Service.

POUTIERS (R.). **Notes biologiques sur la Mineuse du Platane** (*Lithocolletis platani* **Stgr.**) **et ses parasites.**—*Riviera scient.*, xi, no. 4, pp. 79–84, 3 figs. Nice, 1924.

The plane trees of South France, Italy, South Tyrol, Greece and Asia Minor are often attacked by *Phyllorycter* (*Lithocolletis*) *platani*, Stgr., the larvae of which mine the leaves, but do little real damage. There are several generations during the summer, the most harmful being that of August to September. The larvae are parasitised by two Chalcids, *Tetrastichodes platanellus*, Mercet, and a variety of *Sympiesis sericeicornis*, Frst.

HOFFMANN (A.). **Note biologique sur** *Pissodes piniphilus* **Herbst.** (**Col. Curculionidae**).—*Bull. Soc. ent. France*, 1925, no. 2, p. 32. Paris, 1925.

Pissodes piniphilus, Hbst., is recorded from Haute-Vienne, where adults and pupae were found in galleries made in the lower branches of *Abies nordmanniana*.

THOMPSON (W. R.). **Recherches sur la biologie des Diptères parasites.**—*Bull. biol. France & Belg.*, lvii, no. 2, pp. 174–237. Paris, 1923.

This paper deals with the struggle for existence of the early stages of Dipterous parasites and the origin of their specific adaptation to particular hosts.

VOUKASSOVITCH (P.). **Sur la biologie d'un Ichneumonide** (*Dicaelotus erythrostoma* **Wesm.**) **parasite de l'Eudémis** (*Polychrosis botrana* **Schiff.**).—*Bull. biol. France & Belg.*, lviii, no. 4, pp. 495–499, 2 figs. Paris, 1924.

The Ichneumonid, *Dicaelotus erythrostoma*, Wesm., is recorded as a parasite of the vine moth, *Polychrosis botrana*, Schiff., in the

neighbourhood of Toulouse. The parasite apparently prefers to lay its eggs in the pupae, sometimes ovipositing more than once in the same individual.

Grassé (P. P.). **Etude biologique sur** *Phaneroptera 4-punctata* **Br. et** *Ph. falcata*, **Scop.**—*Bull. biol. France & Belg.*, lviii, no. 4, pp. 454–472, 2 pls., 9 figs. Paris, 1924.

The Orthoptera, *Phaneroptera quadripunctata*, Br., and *P. falcata*, Scop., are considered somewhat harmful to vines, the leaves of which they eat, but since they prefer the galls made by *Phylloxera*, and even sometimes attack the Aphids themselves, the damage they do is slight.

Diffloth (P.). **La lutte contre le Doryphore de la pomme de terre.**—*Vie agric. & rur.*, xxvi, no. 13, pp. 213–215, 3 figs. Paris, 28th March 1925.

This is a popular account of the occurrence of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in France and of the measures that have been adopted against it.

Demande de l'Office agricole d'Ansbach, concernant le Doryphore de la pomme de terre.—*Inst. Internat. d'Agric.*, 4 pp. Rome, 1925.

Owing to a letter received from Germany suggesting an international conference on the subject of the Colorado beetle (*Leptinotarsa decemlineata*, Say), an account of the situation is given by G. Trinchieri, who points out that, as explained by J. Feytaud, the present infestation in France has affected only a small number of fields all situated within a radius of less than 90 miles. In view of its limited spread during the last 2½ years and of the intensive campaign that is being waged against it in France, an international conference on the subject is considered unnecessary.

Woroniecka (J.). **Przeglad wazniejszych szkodników, występujących na terenie Lubelszczyzny i Kieleckiego w 1924 roku.** [Agricultural Pests observed in the Districts of Lublin and Kielce in 1924.]—*Mém. Inst. nat. polon. Econ. rur. Pulawy*, v, pt. A, pp. 379–392. Krakow, 1924. (With a Summary in English.) [Received 8th April 1925.]

Cabbages were attacked by *Pieris brassicae*, L., and *Plutella maculipennis*, Curt. (*cruciferarum*, Zell.). The larvae of *Pyrameis cardui*, L., thought to live exclusively on nettle and thistle, have been found on *Lupinus angustifolius*. *Hypera* (*Phytonomus*) *murina*, F., occurred frequently in lucerne fields. *Apion apricans*, Hbst., was particularly abundant, the young seeds of clover being damaged by the larvae and beans by the adults. Development of half-grown larvae may take place in mown and dried clover. Considerable damage was caused by *Oscinella* (*Oscinis*) *frit*, L., to young summer and winter-sown cereals, the third generation being a serious pest of oats. *Chlorops taeniopus*, Meig., was widely distributed, being particularly injurious to summer-sown wheat and barley, though also occurring on winter-sown wheat. *Pegomyia hyoscyami*, Panz., was

common on beet in many localities. *Hylemyia coarctata*, Fall., caused considerable injury to winter-sown rye and wheat. There is one generation a year; pupation occurs in the soil during the first half of May, and the adults appear in June.

Hyponomeuta malinellus, Zell., is an important annual pest of apples, the larvae destroying almost half the foliage; *Malacosoma neustria*, L., and *Blastodacna putripennella*, Zell., were also abundant. *Cydia* (*Laspeyresia*) *pomonella*, L., has two generations a year in Central Poland, the adults of the first brood appearing towards the end of May, and those of the partial second one in September.

During 1924 *Anthonomus varians*, Payk., occurred in large numbers on pines in the forests. The eggs are laid during spring in the male blossoms, the larvae destroying the pollen. Pupation occurs on the food-plant in June, at the end of which month the adults emerge. The author's observations on the development of this weevil agree with those of Trägårdh and of Wichmann [*R.A.E.*, A, xi, 172, 434].

Kozikowski (A.). **Niektóre zagadnienia z biologji chrabąszcza.** [Some Problems in the Biology of Melolonthids.] Preliminary Information.—*Polskie Pismo ent.*, iv, pt. 1, pp. 3–14. Lemberg, 1925. (With Summary in German.)

Melolontha melolontha, L. (*vulgaris*, L.), and *M. hippocastani*, F., occur in Poland, but *M. pectoralis*, Germ., has not yet been found there. The years of flight of these species in various districts are recorded. Except in the northerly districts where a flight appears to occur every five years, a four-year cycle is usual.

Kozikowski (A.) & Kuntze (R.). **Notaki ipidologiczne z Polski.** [Notes on Scolytids from Poland.]—*Polskie Pismo ent.*, iv, pt. 1, pp. 18–23. Lemberg, 1925. (With Summary in German.)

This paper contains faunistic and biological notes on bark-beetles occurring in Poland. The species dealt with include *Pityogenes chalcographus*, L., the food-plants of which include *Pinus mughus*. *P. bistridendatus*, Eichh., infests *P. mughus* and spruce in the Carpathians, whereas in the Alps it is supposed to be restricted to *Pinus cembra*.

Krasucki (A.). **Spostrzezenia nad pojawem Ziołomirków** (*Phytonomus* **Schönh.) w Dublanach ob. Lwowa w roku 1923.** [Observations on the Occurrence of *Phytonomus* spp. in Dublany near Lemberg in 1923.]—*Polskie Pismo ent.*, iv, pt. 1, pp. 62–67. Lemberg, 1925. (With a Summary in German.)

The life-history of *Hypera* (*Phytonomus*) *variabilis*, Hbst., and *H.* (*P.*) *murina*, F., is briefly summarised as follows: There is one generation a year; the winter is passed as an adult; eggs are laid about the middle of June, the larvae appearing from the beginning of June. Pupation occurs towards the end of June and lasts about two weeks. The adults of the new generation appear at the beginning of July. The life-cycle lasts from July of one year to June of the next.

The Ichneumonid parasites, *Stenocryptus nigriventris*, Thoms., *Adelognathus* sp. and *Mesochorus nigripes*, Rtzbg., were reared from the larvae. The latter were also heavily attacked by a fungus, *Tarichium* sp.

Minkiewicz (S.). **The Apple-sucker** *Psylla mali* **Schmidberger. Part 1. Morphology.**—*Bull. Acad. polon. Sci. & Lettres*, Ser. B, 1924, pp. 589–603, 2 pls. Krakow, 1924. [Received 6th April 1925.]

The morphology, construction of the ovipositor, and variability of colouring of *Psylla mali*, Schmid., are described.

Report of the Institute of Plant Protection for 1923-24. (9th Year.)—*Latvian Central Agric. Soc.*, 62 pp. Riga, 1924.

Of the 135 insects observed in 1923 damaging cultivated plants the following were the more important :—

Hydrellia griseola, Fall., caused considerable damage to barley almost everywhere in Latvia, as well as in Esthonia and Lithuania. In the south, *Contarinia pyrivora*, Ril., seriously attacked pears and caused a reduction of as much as 95 per cent. in the crop. *Cheimatobia brumata*, L., *Aphis pomi*, DeG. (*mali*, L.), *Anuraphis* (*Brachycaudus*) *helichrysi*, Kalt. (*pruni*, F.) and *Myzus cerasi*, F., were abundant. *Trioza viridula*, Zett., which in 1921 and 1922 destroyed the entire crop of carrots in northern Latvia, was scarce. Experiments during the year under review included tests of the susceptibility of carrots to attack by *Psila rosae*, F.

The following parasites of *Panolis flammea*, Schiff. (*piniperda*, Panz.) were obtained: *Henicospilus ramidulus*, Grav., *Aphanistes armatus*, Wesm., *Banchus femoralis*, Thoms., *Plectocryptus arrogans*, Grav., *Lissonota* (*Cryptus*) *fulvipes*, Desv., *Ichneumon pachymerus*, Htg., *I. nigritarius*, Grav., *I. bilunulatus*, Grav., and *Meteorus* sp. There was a serious outbreak of this moth in 1923, and in one forest 150 trees were killed by it.

Detailed observations were made on *Chlorops taeniopus*, Mg., and *Sitona* (*Sitones*) *lineata*, L., in connection with local conditions. *C. taeniopus* has two generations a year and hibernation occurs in the larval stage. The larvae that have hibernated pupate towards the end of May or the beginning of June, and the adults appear at the end of June or beginning of July. The eggs, up to 83 in number, are deposited on barley leaves, 2 or 3 days after the emergence of the adult. The whole life-cycle lasts 36-54 days. The eggs of the next generation are laid on rye. Immediate pupation after hibernation has been observed in several cases ; this resulted in the appearance of a third generation, but is exceptional. The maximum percentage of infestation of rye was 21 per cent. in 1923, but as much as 70 per cent. has been recorded. *S. lineata* has only one generation a year. The eggs are laid on the surface of the soil and can be found from June till August. The maximum number is 383. The larvae develop on the outgrowths of nitrifying bacteria on the roots of peas. In 1923 this stage lasted 55 days, and the first pupae appeared on 22nd August. The pupal stage lasts 18-20 days, and the adults hibernate on the surface of the soil under leaves, etc.

Other studies carried on during the year were on *Phaedon cochleariae*, F., which causes serious damage each year to cabbage and turnip, and on *Hylobius abietis*, L., *Myelophilus piniperda*, L., and *M. minor*, Hart., infesting forests.

[Printz (Ya. I.).] **Принц (Я. И.) Краткий отчет о деятельности энтомологического кабинета Союза виноградарей "Конкордия." 1922-23 годы.** [Report on the Activities of the Entomological Department of the Viticulturists Union "Concordia" for the Years 1922–23.]—**Изд. "Конкордия."** [*Publ. "Concordia"*], 15 pp. [Tiflis] 1923. [Received 12th March 1925.]

The vine pests of the Ganjah (Elizabetpol) region have not previously been studied. The most important is *Polychrosis botrana*, Schiff., which has three generations a year, the greatest damage being caused by the second brood. Next in importance is *Polyphylla fullo*, L., minor pests being *Bycticus betulae*, L. (*Rhynchites betuleti*, L.), *Tetranychus telarius*, L.; and *Eriophyes* (*Phytoptus*) *vitis*, Land. Occasional outbreaks of *Pseudococcus citri*, Risso, have also been recorded, extensive injury having occurred in 1922. This Coccid has two generations a year, the first from the beginning of May to the end of July and the second (hibernating under loose bark) from the beginning of August to the end of April. It does not occur on the roots. In the spring the eggs are laid on the bark. In July the larvae migrate to the leaves, shoots and bunches, on which the next eggs are laid. Spraying with kerosene emulsion or tobacco extract gave indifferent results, but winter cleaning of the stems and painting with kerosene emulsion proved effective when properly carried out. *Phylloxera* has so far not been found in the Ganjah region. A Cecidomyiid has been recorded doing considerable damage; it is thought to be a new species.

[Printz (Ya. I.).] **Принц (Я. И.) Материалы по вредителям и болезням винограда и по искусственному опылению его.** [Notes on Vine Pests and Diseases and the Artificial Fertilisation of the Vine.]—**Изд. "Конкордия"** [*Publ. "Concordia"*], 94 pp., 6 diagr., 14 figs. Tiflis, 1925.

Further details of the bionomics of *Polychrosis botrana*, Schiff., and *Pseudococcus citri*, Risso, in Ganjah are given.

Janetiella oenophila, Haimh., has been recorded from the Caucasus, but its actual occurrence requires confirmation, as the author considers that the species concerned is probably the apparently new midge recorded in the preceding paper. The main injury is caused by the larvae producing galls on the grape-stalks. The majority of the berries formed on these stalks drop off. The observations here described were made during 1922 and 1923. The first adults were noticed on 10th May. The eggs are laid on the leaves, 90 being the maximum number for one individual. They hatch in 10 days, and the larvae at once begin burrowing into the veins of the leaf. They may also form galls on the pedicels of the flowers, these injuries, however, being of less importance than the galls occurring on the stalks of the grapes. As a rule the galls on the grape-stalk are not made until lateral branching occurs. Besides causing deformation, this attack lessens the flow of nourishment to the buds, many of which shrivel; others drop without setting. The larval life in the gall lasts 17 days. Pupation occurs on the ground under any suitable cover

(weeds, etc.), or at a depth of 1 cm. in the ground. In the latter position the cocoon may be attached to plant roots. The larva may remain in the cocoon until the following spring or under optimum weather conditions (plenty of moisture) a second generation may be produced. This second generation, however, is not of any great importance in the region under discussion. All parasites collected were Chalcids, but they have not yet been identified. Parasitised pupae were found in the spring and autumn. About 60 per cent. of the larvae were parasitised. The best preventive method is the regular digging over of the ground. Vineyards remaining undug for several years were always more heavily infested than those in which digging is systematically practised. The soil should be completely turned over so that the cocoons are buried too deep for the adults to emerge.

All the vineyards are bordered by willow trees, which are heavily attacked by the Galerucid, *Lochmaea capreae*, L., var. *pallidipennis*, Küst. This was particularly abundant in 1924, the adult beetles being observed in April. The larvae appear at the beginning of June, and enter the soil to pupate towards the end of the month. No pupae were found on the leaves. Adults were again seen in the middle of September skeletonising the leaves. Presumably, these adults pass the winter in the soil and attack the buds in the following spring. Local remedial measures consist of painting the trees with crude oil, but this only prevents attack when other, untreated trees are present, and eventually kills the tree. Experimentally, Paris green, 1 lb. to 30 gals. water and 10 lb. lime, painted on the younger growth before the buds open (1st April) has given good results.

[Maltzev (M. V.).]. **Мальцев (М. В.) Разведение садовой малины и борьба с ее вредителями.** [The Cultivation of the Garden Raspberry and the Control of its Pests.]—**" В Помощь Земледельцу " Омской Ста. Защиты Раст.** [*" To the Help of the Agriculturist," Omsk Sta. Plant Protect.*], reprint, 6 pp. Omsk, 1924. [Received 1st April 1925.]

This popular account of the cultivation of the raspberry includes brief notes on its more important insect pests, which are dealt with under their popular names only. General instructions are given for the preparation and application of Paris green and tobacco extracts.

[Vinokurov (G. M.).] **Винокуров (Г. М.). Проблемы изучения приманочного метода.** [Problems for Study in the Method of Baits.]—**Извест. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 1–13. Novonikolaevsk, November 1924. [Received 25th March 1925.]

A general review of various methods of pest control based on exploitation of tropisms is given, bait methods being considered generally much more valuable and promising than others. Existing knowledge of insect behaviour, and of tropisms in particular is, however, very inadequate, and extensive research is urged. The investigations should be based on exact physiological and chemical lines.

[Uvarov (B. P.).] **Уваров (Б. П.) Борьба с саранчей опыливанием.** [Control of Locusts by Dusting.]—**Извест. Сибирск. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 14–15. Novonikolaevsk, November 1924. [Received 25th March 1925.]

Results obtained by dusting against locusts in South Africa by Mally [*R.A.E.*, A, xi, 251] are briefly described, and the suggestion is made that this method may be of advantage against the Asiatic locust [*Locusta migratoria*, L.]. The cost of dusting might possibly be reduced, without affecting the results, if dry mixtures of the sodium arsenite with some neutral powder, such as lime, were used.

[Valova (A. V.).] **Валова (А. В.). Питание** *Stenobothrus morio* **Fabr. и других северных кобылок.** [The Feeding of *Stauroderus scalaris*, F.W., and of other northern Species of Grasshoppers.]—**Извест. Сибирск. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 16–35, 4 charts. Novonikolaevsk, November 1924. [Received 25th March 1925.]

Observations on the feeding of larvae and adults of several species of grasshoppers were conducted in the summer of 1922 at a field laboratory in Tarandov, Tomsk province, the principal species studied being *Stauroderus scalaris*, F.W. (*Stenobothrus morio*, auct.), while some observations were also made on other species of *Stenobothrus* and *Chorthippus*, *Arcyptera fusca*, Pall., and *Gomphocerus sibiricus*, L.

The feeding of *S. scalaris* was tested with insects in cages kept in the laboratory under as natural conditions as possible as regards temperature, etc. The larvae, with rare exceptions, begin to take food on the day after hatching. The amount of food eaten varies with the temperature and increases rapidly with the growth of the larva, the fourth (last) stage individuals devouring, on the average, nearly six times as much in a day as those of the first stage. The amount of food taken by the insect in the adult stage exceeds considerably that devoured by the larva, though the actual injury to the crops is then less serious, because the plants are older and less succulent.

Observations on the influence of meteorological factors on feeding have not given very clear results, though the amount of food taken increases in bright warm weather. It was found that no food is ever taken between sunset and sunrise, the definite periods of more intensive feeding during the day being between 5–6, 7–8 and 11–12 a.m., and 5–6 p.m., the latter being the most important of all.

[Vorontzovski (P. A.).] **Воронцовскии (П. А.) К биологии саранчевых** (Acridodea). [On Bionomics of Acrididae.]—**Извест. Сибирск. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 36–40. Novonikolaevsk, November 1924. [Received 25th March 1925.]

This is a short ecological study on grasshoppers in the vicinity of Orenburg, the main species referred to being *Calliptamus italicus*, L.,

Arcyptera microptera, F.W. (*flavicosta*, F.W.), *Dociostaurus brevicollis*, Ev., *D. kraussi*, Ingen., *Oedaleus decorus*, Germ. (*nigrofasciatus*, DeG.), *Oedipoda coerulescens*, L., and *Stenobothrus* spp.

[Maltzev (M. V.).] **Мальцев (М. В.). Из наблюдений над саранчевыми в 1923 г. в лаборатории Омской Станции Защиты Растений.** [Some Observations on Acrididae in 1923 in the Laboratory of the Omsk Station for the Protection of Plants.]—**Извест. Сибирск. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 41–44. Novonikolaevsk, November 1924. [Received 25th March 1925.]

Observations on the development and habits in the laboratory of *Chrysochraon brachypterus*, Ocsk., are described.

[Berezhkova (A. A.).] **Бережкова (А. А.). Яйцеед темнокрылой кобылки** (*Stenobothrus morio* F.) **Предварительное Сообщение.** [An Egg-parasite of *Stauroderus scalaris*, F.W. Preliminary Information.]—**Извест. Сибирск. Станц. Защиты Раст. Вредит.** [*Bull. Siberian Sta. Plant Protect. Pests*], no. 1, pp. 45–47. Novonikolaevsk, November 1924. [Received 25th March 1925.]

An as yet unnamed Proctotrupid parasite has been found in the eggs of *Stauroderus scalaris*, F.W. (*Stenobothrus morio*, auct.) in the Tomsk province, as many as 25–65 per cent. of the egg-masses having been infested in 1923. All stages of development of the parasite are briefly described. Three other unidentified Hymenopterous parasites have also been bred from the egg-masses of this grasshopper.

[Kharitonov (D. E.).] **Харитонов (Д. Е.). К фауне короедов Пермского лесничества.** [The Bark-beetle Fauna of the Perm Forests.]—**Изв. Биолог. Научно-Исслед. Инст. при Пермском Университете.** [*Bull. biol. Sci.-Expt. Inst., Perm Univ.*], iii, pt. 5, pp. 199–204. [Perm], 1924. [Received 19th March 1925.]

Of the 22 bark-beetles now known from Perm the following are recorded for the first time from this locality :—

Scolytus (*Eccoptogaster*) *ratzeburgi*, Jans., *Myelophilus piniperda*, L., *Xylechinus pilosus*, Ratz., *Crypturgus pusillus*, Gyll., *C. cinereus*, Hbst., *Hylastes ater*, Payk., *H. cunicularius*, Er., *Ips sexdentatus*, Boern., *I. proximus*, Eichh., *Cryphalus tiliae*, Pnz., *Xyloterus signatus*, F., and *X. lineatus*, Oliv.

Hoke (G.). **A Diaspine with Legs (Homoptera : Coccidae).**—*Proc. Ent. Soc. Wash.*, xxvii, no. 2, pp. 36–40, 1 pl. Washington, D.C., February 1925.

Leucaspis knemion, sp.n., is described from Syria on *Pinus pinea*. So far as is known this is the first adult female Diaspine in which legs have been recognised. A comparative chart is given showing the characters of the species of *Leucaspis* on *Pinus*.

Bodenheimer (F. S.). **Ueber die Ausnutzung des durch Pflanzenneueinführungen entstandenen freien Nahrungsraums durch einheimische Insekten.** [On the Utilisation by Indigenous Insects of the Additional Food arising as a Result of newly-introduced Plants.]—*Biol. Zentralbl.*, xliv, no. 12, pp. 671–674. Leipzig, January 1924.

It has been observed that a fresh food supply, due to introduced plants, is not always taken full advantage of by indigenous insects. To illustrate this a list is given of plants introduced into Palestine, with the few native insects that, even after many years, are to be found attacking them. The insect fauna of introduced plants generally consists, in addition to any insects imported with the plants, only of cosmopolitan species and markedly polyphagous indigenous ones.

Petch (T.). **Entomogenous Fungi and their Use in controlling Insect Pests.**—*Ceylon Dept. Agric.*, Bull. 71, 40 pp., 2 pls. Peradeniya, January 1925.

To give some idea of the number of different species of fungi that may be parasitic on insects in any tropical country, a list of some 130 species of entomogenous fungi found in Ceylon alone is given, and this list is certainly not complete. All attempts to use these fungi artificially for the control of insect pests have resulted in failure, although they do undoubtedly exercise a certain degree of natural control. In view of the repeated proposals to increase the efficacy of entomogenous fungi almost every time that a new one is discovered, the author summarises briefly the results of the principal attempts in this direction. Accounts are given of *Sporotrichum globuliferum* used against *Blissus leucopterus*; *Metarrhizium anisopliae*, used chiefly against the froghopper, *Tomaspis saccharina* (*varia*); *Aschersonia* spp. against *Aleurodes* spp.; various entomogenous fungi of the West Indies against Coccids; *Cephalosporium lecanii* against *Coccus* (*Lecanium*) *viridis*; a supposed species of *Entomophthora* against South African locusts; *Coccobacillus acridiorum* against various locusts; and wilt disease against the gipsy moth, *Porthetria* (*Lymantria*) *dispar*.

The history of outbreaks of fungus disease among insects is always the same; the insect multiples to epidemic proportions, and the fungus then appears and kills off large numbers. The fungus cannot in any case prevent an epidemic of insects, and only comes into play after they have become excessively numerous. In some cases, such as the fungus disease of *Aleurodes* in Florida, the fungus is always present and creates periodic epidemics—in this case, every three years. It is impossible, however, to create such an epidemic in the first or second year, or at any time when it does not occur naturally. It has been proved scientifically that during an epidemic of fungus disease, no amount of spraying of spores or distribution of the fungus has any appreciable effect in intensifying the outbreak. Neither is it possible to create an epidemic by introducing these fungi into countries where they do not occur, for if they are not present, there will be found some combination of circumstances that makes their growth impossible there. There is, therefore, nothing that will warrant the recommendation of the use of entomogenous fungi as a method of controlling insect pests. The apparently successful results obtained by certain workers are without scientific proof, and in this connection it is pointed out that

in the case of locust diseases the evidence showed that it was impossible that the organisms employed could have had any effect, and also that, in general, each of the so-called successful methods when adopted on a large scale has been abandoned, though the insect concerned is still a serious pest.

[Fletcher (T. B.).] **List of Publications on Indian Entomology, 1923.**—*Agric. Res. Inst., Pusa,* Bull. 155, 59 pp. Calcutta, 1924. [Received 16th March 1925.]

The contents of this paper are indicated by its title, the publications being arranged under the author.

Fletcher (T. B.). **Report of the Imperial Entomologist, 1923-24.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1923-24,* pp. 52–60. Calcutta, 1924. [Received 30th March 1925.]

Insect pests of the year included larvae of *Diacrisia obliqua, Amsacta lineola, Prodenia litura, Psara bipunctalis,* and an unidentified Pyralid on sugar-beet; larvae of *Euproctis subfasciata* on cabbage leaves (an unusual food-plant); *Scirpophaga xanthogastrella* boring in sugar-cane; *Monophlebus contrahens* on peach, plum and mango; *Pseudococcus virgatus* on roses and violets; *Aulacophora abdominalis* on melons and gourds; *Hypera* spp. on lucerne; and *Crocidolomia binotalis* and *Hellula undalis* on cabbage and cauliflower seedlings. The study of *Eublemma amabilis,* the enemy of lac insects, was continued. No alternative host has yet been discovered, though a species of *Eublemma* near *E. trifasciata* was again bred from *Pseudococcus corymbatus* on cotton shoots. The study of the parasites of lac insects has also been taken up. An Encyrtid has been found to parasitise the adult females of the June-July crop to a large extent.

Husain (M. A.). **Annual Report of the Entomologist to Government, Punjab, Lyallpur, for the Year 1922-23.**—*Rept. Dept. Agric. Punjab, 1922-23,* ii, pt. 2, pp. 177–204. Lahore, 1924. [Received 16th March 1925.]

Damage to cotton by *Earias insulana* and *E. fabia* was below normal during 1922–23 in the Punjab. Investigations in many localities have proved that bolls attacked by these bollworms fall off in large numbers when plants are shaken by wind or rain; rope dragging and flooding are therefore very beneficial, the former to take the place of the shaking and the latter to drown the caterpillars. Attacks of *Sphenoptera gossypii* (cotton stem-borer) were reported from two districts. As breeding chiefly occurs in the cotton sticks left standing after removal of the crop, the safe disposal of these seems to be the only economic way of dealing with this beetle. *Platyedra gossypiella* (pink bollworm), which has been considered a minor pest, is the cause of quite serious infestations in some localities. The indications are that the pest is not conveyed to the fields with seed, but that the moths fly to the fields from cotton stores. The custom of sun-drying cotton and beating it with sticks, which is followed in certain parts of the province, kills the bollworms in large numbers, though this is

not practised in the big mills. Other insects observed on cotton, and not mentioned in recent reports [*R.A.E.*, A, xii, 91], were *Tarache notabilis* and *Euproctis fraterna*.

A study of moth borers has revealed the fact that *Chilo simplex*, which is found in large numbers in the stubble of maize and *Sorghum*, was only occasionally present in the stubble of sugar-cane. On the other hand, *Diatraea auricilia*, *Emmalocera* and *Scirpophaga* sp. have not as yet been taken from any maize or *Sorghum* stubble or plant. It therefore seems that maize would be useless as a trap-crop to save sugar-cane. A list of borers found, and of the food-plants of each, is given, with a table showing the relative proportion of borers attacking young cane and maize. A table shows the percentage of attack in different varieties, and as this varied considerably, experiments are to be made to determine the resistance of each. Removal of dead hearts of sugar-cane was practised with success, the plants tillering well. Most of the moth-borers remain in shoots and stubble until the end of March, and if stubbles were collected and burnt, even during that month, the sugar-cane crop would be saved. The first moths were observed in the field about mid-March, but the main emergence was in April. *Pyrilla* spp. did serious damage to sugar-cane and maize; bagging was tried with very satisfactory results; as both nymphs and adults jump upwards when disturbed, they can be effectively collected in bag nets, but this can only be practised on a young crop. Aleurodids are serious pests in every year from September onwards, and mites attack the leaves of young cane, which turn red and dry up.

On *Citrus*, there are nine generations of *Euphalerus citri* in a year, the greatest activity being in the spring, when the new leaves appear. Some of the adults hibernate during the winter; the life-history has been worked out [*R.A.E.*, A, xii, 383], and nine species of parasites have been reared. Investigations into the activities of one of these, *Tetrastichus radiatus*, have shown that, unfortunately, it is least numerous at the time when the pest is most active—in March and April. In spraying operations against this Psyllid, 28 cc. creosote, with 4 oz. soap in 11,200 cc. water, killed 90 per cent. of the insects; crude oil emulsion in water gave good results, but crude oil emulsion with tobacco decoction was not effective. Four Aleurodids, of which the commonest are *Dialeurodes citri* and *Aleurocanthus spiniferus*, are becoming increasingly serious pests of *Citrus*. Concerted action is essential against these pests, and legislation is the only remedy. Crude oil emulsion has been tried against them with varying results, and fumigation is to be tested. *Phyllocnistis citrella* attacks nursery plants, killing the leaves by mining. Other insects attacking *Citrus* are *Papilio demoleus* and Coccids, including *Monophlebus* sp.

Air-tight storage of grain for the purpose of killing insects was found very successful in flasks and small receptacles, but failed in large ones. Experiments in treating warehouses with carbon bisulphide, hydrocyanic acid gas and superheating, showed heat to be the cheapest, safest and most reliable.

Vegetable pests included the beetle, *Aulacophora abdominalis*, which is very injurious on Cucurbits. There are about six generations in a season, the life-cycle requiring about 40 days. Eggs are laid in the soil, and the larvae live on rotten leaves and bore into the root, stem and fruit of plants. Pupation occurs in the ground to a depth of 10 inches. Flooding does not affect the insects. Paris green mixed

with 8 parts of road dust gave satisfactory results when the dusting was repeated at frequent intervals. A severe outbreak of *Hieroglyphus furcifer* on maize and *Sorghum* was reported, and another of larvae of *Dichocrocis punctiferalis* on young shoots of loquat. *Leptocorisa varicornis* (rice bug) was numerous throughout the rice-growing area; bagging tried in one or two places gave good results, but further investigations are needed.

FULMEK (L.). **Iets over de toepassing van bestrijdingsmiddelen bij Delitabak.** [Notes on the Application of Insecticides and Fungicides to Deli Tobacco.]—*Deli Proefst.*, Vlugschr. 29, 4 pp., 1 diagram. Medan, n.d.

The contact insecticides used in Deli, Sumatra, against tobacco pests include kerosene, soap emulsion, nicotine, and derris. The addition of 0·3–0·5 per cent. soap to solutions of the last two is advised. Stomach poisons used against caterpillars are lead arsenate and Paris green. A diagram is given indicating the combinations of these that may be used.

FULMEK (L.). **Bestrijding van bladluizen.** [Measures against Aphids.] —*Deli Proefst.*, Vlugschr. 30, 4 pp. Medan, n.d.

A precautionary measure against the infestation of tobacco by Aphids is to see that the insects are not carried into the fields when transplanting from the seed beds. This is ensured by dipping the seedlings in an insecticide solution, such as one containing derris, which may be combined with lead arsenate and soap for use against caterpillars [*R.A.E.*, A, xii, 270]. For spraying in the field, a 1 per cent. solution of derris with $\frac{1}{2}$ per cent. soft soap may be used. The application should be repeated four days later.

MENZEL (R.). *Helopeltis* **en sluipwespen.** [*Helopeltis* and Hymenopterous Parasites.]—*De Thee*, iv, no. 4, pp. 118–119. Buitenzorg, December 1923. [Received 18th March 1925.]

A parasite of *Helopeltis* on tea, probably a Braconid, is recorded.

BERNARD (C.). **Over een parasiet van** *Helopeltis*. **I. Inleiding.** [On a Parasite of *Helopeltis*. I. Introductory Note.]

MENZEL (R.). **Over een parasiet van** *Helopeltis*. **II. De in** *Helopeltis* **parasiteerende sluipwesp.** [II. The Hymenopterous Parasite of *Helopeltis*.]—*De Thee*, v, no. 1–2, pp. 24–29, 1 pl. Buitenzorg, March-June 1924. [Received 18th March 1925.]

The sudden decrease of an infestation of tea by *Helopeltis* in Java may be due to the action of a natural enemy, although observers have not attached much importance to this factor in the past.

Dr. Menzel gives further information on this parasite of *Helopeltis*. It is a Braconid, of the genus *Apanteles*, and may prove to be a new species. In some cases from 50 to 90 per cent. of the larvae of *Helopeltis* were parasitised.

Menzel (R.). *Tricholyga sorbillans* **Wied., een parasietvlieg van** *Andraca, Metanastria* **en** *Attacus*. [*T. sorbillans*, a Fly Parasite of *Andraca, Metanastria* and *Attacus*.]—*De Thee*, iv, no. 4, pp. 119–120. Buitenzorg, December 1923. [Received 18th March 1925.]

The Tachinid, *Tricholyga sorbillans*, Wied., has been bred in Java from *Andraca* [*bipunctata*], and from *Metanastria*. It is also probably a parasite of *Attacus*. As a parasite of *A. bipunctata* it has played an important rôle in checking an outbreak [*R.A.E.*, A, xi, 89].

Menzel (R.). **Het nuttig optreden der parasietvlieg van "hileud badjera"** (*Setora nitens*) **in Japan.** [The Useful Occurrence of the Fly Parasite of *S. nitens* in Japan.]—*De Thee*, iv, no. 4, pp. 120–121. Buitenzorg, December 1923. [Received 18th March 1925.]

The Tachinid, *Chaetexorista javana*, B. & B., which is well known as a parasite of *Setora nitens*, Wlk., a Limacodid pest of tea in Java, has proved a valuable auxiliary against *Cnidocampa flavescens*, Wlk., in Japan [*R.A.E.*, A, xi, 413]. It therefore seems to be a specific parasite of Limacodids.

Bernard (C.). **De bestrijding van rupsen door middel van natuurlijke vijanden.** [The Control of Caterpillars by Means of Natural Enemies.]—*De Thee*, iv, no. 4, pp. 121–125, 1 fig. Buitenzorg, December 1923. [Received 18th March 1925.]

A severe attack on about 370 acres of tea by *Stauropus alternus* in Sumatra was checked by *Apanteles stauropi* in 1923. The breeding of the parasite was assisted by collecting the caterpillars in gauze-covered boxes.

Garretsen (A. J.). **Enkele aanteekeningen over** *Helopeltis*. [Some Notes on *Helopeltis*.]—*De Thee*, iv, no. 4, pp. 125–128. Buitenzorg, December 1923. [Received 18th March 1925.]

Suggestions are made for experiments with the van Hooff's Tjiboengoer method of pruning and for the use of various green manure plants in connection with the infestation of tea by *Helopeltis* [*R.A.E.*, A, xi, 215, 216, 542].

Kalshoven (L.). **Nog eens boeboek en boordergaatjes in triplex.** [A further Note on Beetles and Borer-holes in Three-ply Wood.]—*De Thee*, iv, no. 4, pp. 132–138, 1 pl. Buitenzorg, December 1923. [Received 18th March 1925.]

This note supplements an article already noticed [*R.A.E.*, A, xi, 542]. The Lyctid beetle mentioned has been identified as *Lyctus brunneus*, Steph. The species, recorded as *Minthea* sp., is probably *M.* (*Lyctopholis*) *rugicollis*, Wlk. This also is a more or less cosmopolitan species. A third beetle, since found in dry wood, is probably a species of *Anobium*. A predacious beetle, possibly the Clerid, *Tarsostenus univittatus*, Rossi, destroys these Lyctids, which are also attacked by a Hymenopterous parasite. These pests are able to bore through thick tea-chest lead, so that it is possible for the tea to

be contaminated with frass. The borers attacking green wood do not occur in dried timber. The differences between the injuries due to dry-timber beetles and to those attacking green wood are tabulated.

Bernard (C.). **Naschrift.** [Addendum to L. Kalshoven's Article "Nog eens boeboek en boordergaatjes in triplex."]—*De Thee*, iv, no. 4, pp. 138–139, 2 pls. Buitenzorg, December 1923. [Received 18th March 1925.]

Referring to the preceding paper, the author points out that all infestation by green wood borers must be destroyed by the heat and pressure used in manufacturing three-ply wood. Two plates are given showing the different appearance of the borings by green-wood and dry-timber borers.

Van der Ham (W. P.). **Het** *Helopeltis*-**vraagstuk.** [The *Helopeltis* Question.]—*De Thee*, v, no. 1–2, pp. 38–41. Buitenzorg, March-June 1924. [Received 18th March 1925.]

Speaking as a practical planter the author states that if a tea plot infested with *Helopeltis* is allowed to remain unplucked for three pluckings the bushes will then be restored to good condition, and plucking may be proceeded with. His experience has further been that the women employed to catch *Helopeltis* regularly breed the latter, up to 80 per cent. of the "catches" being material brought by them into the plots. They collect twigs bearing eggs and place them in a pan and pour water over them, though not enough to submerge them. The pan is then covered and the larvae are found to have hatched next morning.

Sonan (J.). **Insect Pests of the Tea-plant in Formosa. Part I.**—*Dept. Agric., Res. Inst.*, Rept. 12, pp. 1–132, 3 pls. Taihoku, Formosa, November 1924. (In Japanese.)

There are 85 insects that are injurious to tea in Formosa, of which 15 are of importance. In this report only three are dealt with. *Andraca bipunctata*, Wlk., usually has three generations a year. The adult moths are diurnal in habit. The eggs are laid in groups on the lower surface of the leaf, one female producing 86 on an average. The egg stage varies from 7 to 23 days according to the temperature. The larvae are gregarious in the first four instars, but this habit becomes less marked in the later ones. They also attack the leaves of *Gordonia anomala*, *Cleyera ochnacea*, *Melastoma candidum* and *Eurya* sp. They spin cocoons 20–41 days after hatching and pupate 2–7 days later. The pupal stage varies greatly (9–131 days) amongst individuals, even in the same season. The Pentatomid, *Cantheconidea furcellata*, Wolff, sometimes kills the larvae, and *Tachina larvarum*, L., and *Crossocosmia sericariae*, Cornalia, are parasitic on them but do not constitute an effective control. Four species of bacilli also infest them.

Helopeltis fasciaticollis, Popp., is the most important of the species of this genus in Formosa. It has a wide range of food-plants, of which tea and *Gordonia anomala* are the most favoured. The adults may be seen at any season of the year damaging the tea-plant. Mating takes place four days or more after hatching, and occurs several times during life. The eggs are laid five days later and at any season except from November to March or April. The female makes a hole

with its rostrum on the young tissue of the food-plant in which it lays a single egg. More than 200 eggs are laid during life. The egg stage lasts 5–11 days and the nymphal 8–22 days, during which period five moults beside the pronymphal ecdysis take place. The adults live about 30 days on an average. *Paratenodera sinensis*, Sauss., *P. aridifolia*, Stoll., and *Micromantis formosa*, Shiraki, sometimes prey on this pest.

H. cinchonae, Mann., of which *H. brevicornis*, Popp., is regarded as a synonym, attacks a great variety of plants, of which *Psychotria elliptica*, *Solanum nigrum*, *Piper futokadsura*, *Pilea ovatinucula*, *Cinchona lancifolia*, etc., are the most injured, though slight damage is also done to tea. The life-history is much the same as that of *H. fasciaticollis*. The habits and life-history of another Formosan species, *H. pallidus*, Popp., are not known.

Fey (K. Y.) & Wang (L. N.). **A Calendar for Control of Paddy Borer.**—*Bur. Ent. Chekiang, Kashing*, Pop. Bull. 1, 1 sheet. Chekiang, China, May 1924. (In Chinese.)

The paddy borer, *Schoenobius incertellus*, Wlk., is one of the most injurious pests of rice in China, and this calendar describes the methods of its control month by month.

Asa (V. C.) & Fey (K. Y.). **Destruction of the Eggs of Paddy Borer (Pyralid, Lepidoptera).**—*Bur. Ent. Chekiang, Kashing*, Pop. Bull. 2, 16 pp., 1 fig. Chekiang, China, May 1924. (In Chinese.)

A description is given of the character of the eggs of *Schoenobius incertellus*, Wlk., and *Chilo simplex*, Butl., their natural enemies and the methods of collecting the egg clusters. In the south-eastern part of the Republic of China the period of oviposition of the former occurs three times a year, at the end of May, middle of July and end of August. In the case of *C. simplex* there are only two oviposition periods, the middle of July and the beginning of August. Collection of the egg clusters is an effective measure.

Asa (V. C.). **Suggestion for Control of the Moths of the Paddy Borer.**—*Bur. Ent. Chekiang, Kashing*, Pop. Bull. 3, 21 pp., 1 fig. Chekiang, China, June 1924. (In Chinese.)

The characters and habits of the adults of the paddy borer moths are described, and various measures against them are suggested, including the use of natural enemies, nets, and trapping by lanterns. These proved successful over one large area.

Naranga diffusa **as a Pest of Rice (Noctuidae).**—*Bur. Ent. Chekiang, Kashing*, Pop. Bull. 4, 16 pp., 1 fig. Chekiang, China, July 1924. (In Chinese.)

Naranga diffusa, Wlk., has recently been one of the greatest pests of rice in the western part of the Chekiang province. It has many natural enemies. Of 483 larvae, 122 were killed by parasitic Hymenoptera, including 2 Braconids and a Chalcid, and 12 by a fungus.

Fey (K. Y.). *Delphax* **infesting Rice at Chekiang.**—*Bur. Ent. Chekiang, Kashing*, Pop. Bull. 5, 14 pp., 1 pl., 1 fig. Chekiang, China, August 1924. (In Chinese.)

Rice in the Chekiang province has often been damaged considerably by several species of *Delphax*. As long ago as 1578 D.C. [*sic*] the western part of the province suffered from a severe outbreak of this pest. The old remedy was to shake the insects off the plants and to pour cabbage oil and wood oil on the surface of the water, but in recent years petroleum has been substituted, and is more effective.

Hesse (R.). **Zerstörung von Bleiröhren durch Tiere.** [Destruction of Lead-tubing by Animals.]—*Biol. Zentralbl.*, xlv, no. 1, pp. 19–20, 2 figs. Leipzig, 1925.

Besides woodwasps and beetles (*Tetropium, Hylotrupes*) that bite into lead, a bee of the genus *Xylocopa* is recorded making a hole in the lead covering of a cable at Shanghai.

Groff (G. W.) & Howard (C. W.). **The Cultured Citrus Ant of South China.**—*Lingnaam Agric. Rev.*, ii, no. 2, pp. 108–114, 3 pls. Canton, China, February 1925.

Chinese growers of *Citrus* in certain of the fruit-producing districts of Kwangtung commonly practise the culture of *Oecophylla smaragdina*, F., the well-known red tree ant of the tropics, claiming that it kills destructive insects on the trees. In regions that are too cold for the ant to survive the winter, nests are brought from warmer localities in the early months of the year before the ants have emerged, and are placed in the crutches of the trees, candle wax being smeared about the branches to prevent the ants from escaping when they leave the nests. With the first warm weather the ants become active, and each colony builds a new and larger nest by weaving together the leaves of the orange tree. To encourage their dissemination, the growers build bridges of strips of bamboo from tree to tree on which the ants can cross, and even prepare special food for them during the early months of the year. The growers maintain that without these ants on the trees, very few fruits form, and those that do chiefly drop to the ground or develop with blemishes. In particular, *Tesseratoma papillosa* (stink bug) and boring insects are said to be driven from the trees. The ants are also found on the wild Chinese olive (*Canarium* sp.) and on bamboo. When the weather becomes cold, they all return to their nests and do not emerge until the following spring. Their bite is very painful to man. A number of nests were taken and the ants kept under observation, both in cages and on *Citrus* trees. All other species of ant that approached the trees were killed or driven off, and all caterpillars were attacked and killed, except those covered with hair. The ants did not, however, destroy Coccids and not always Aphids ; the leaves included in the nests are usually full of soft scales. Their economic value is therefore questionable, and the advantage of their culture has not been scientifically established.

New South Wales : Plant Diseases Act, 1924.—14 pp. Sydney, 17th December 1924.

This Act, to make further provision to prevent the introduction into, and spread in, New South Wales of diseases and pests of plants

and fruit, repeals the Vine and Vegetation Diseases and Fruit Pests Act, 1912.

The powers of the Governor, the Minister of Agriculture and of Inspectors as regards proclaiming ports of entry, quarantine, seizing and treatment of plants, etc., right of search of premises, steps to be taken when diseases or pests are found, and, generally, for the proper carrying out of the Act, are defined. Any disease or pest found on any land must be notified by the occupier within 24 hours, and all orchards and nurseries must be registered. The Governor may at any time require all cotton plants in any area to be uprooted and destroyed.

ROUGHLEY (T. C.) & WELCH (M. B.). **Wood Borers damaging Timber in Australia.**—*Technological Mus.*, Bull. no. 8, 27 pp., 18 figs. Sydney, 1923. [Received 9th March 1925.]

Borers attacking living forest trees include Cerambycids, Hepialids, Buprestids and Curculionids. Few forest trees are immune from attack, though *Eucalyptus, Acacia, Casuarina, Banksia, Angophora* and pine seem to be particularly susceptible.

Seasoned timbers are chiefly attacked by *Lyctus brunneus*, Steph. (powder post beetle) and by *Anobium domesticum*, L. (furniture beetle). Adults of the former emerge chiefly during October and November, and the female oviposits a few days later in the pores of the wood. The grubs feed on the wood and pupate near the surface. The emergence holes of the adults are generally the first sign of attack, and by the time they are noticed much of the wood may have been eaten away. The length of life of the grub depends to a great extent on the nature and condition of the timber attacked. While approximately a year is usually required for the life-cycle from egg to adult, it is possible that under exceptionally favourable conditions two or more generations may be produced in that time. Much damage is done to hardwoods used in building and to many furniture timbers, but the sapwood only is attacked. Pine does not seem to be infested. Practically all damage could be eliminated if the sapwood of logs were cut to waste. The milling of immature logs, consisting almost entirely of sapwood, is another source of much trouble, and it should be made illegal to dispose of sapwood intended for constructional work unless it has previously been given some approved treatment. *Schizomeria ovata* and some species of *Ficus* should be avoided as being particularly susceptible to infestation. Owing to the sudden and increased demand for Australian hardwood during the War, supervision of the quality of timber supplied has grown somewhat more lax, with the result that the prevalence of borers in Australian timber has increased enormously during the past few years. Signs of infestation usually appear shortly after seasoning, indicating that eggs are deposited in the timber while the log is in the bush or soon after conversion at the mill. The infestation may pass entirely unnoticed during working, as the eggs are microscopic in size.

The life-history of *Anobium domesticum* is very similar, except that the eggs are laid in cracks and crevices of the timber, and preference is shown for wood that is old and thoroughly dry. The grub does not reduce the whole of the wood to a fine powder, as in the case of *L. brunneus*, but honeycombs it with tunnels, both the heartwood and sapwood being attacked. In the appendices a list is given of 76 species of Australian timbers and 6 exotic species attacked by

L. brunneus, and 10 Australian species and 15 exotic liable to infestation by *Anobium* ; the latter category could probably be extended to include most woods used in the manufacture of furniture. Borers may be present in timber or furniture long before evidence of infestation appears ; therefore as soon as any emergency holes are observed the wood should be treated at once. Timber may, however, be entirely free from borers and yet show holes previously made by emerging shot-hole borers ; such holes can usually be distinguished by a dark stain round the margin, while holes within which borers are working generally have powder coming from them.

Creosote is the most efficient deterrent liquid that has yet been found, and for external work, or where discoloration does not matter, it is always recommended, the vapour alone being sufficient to kill both grubs and beetles. The creosote should be applied liberally with a brush or as a spray. Where it is desirable to avoid staining, a mixture of creosote and kerosene may be used ; 1 part of creosote to 8 of kerosene leaves no stain if the creosote is not too dark. Orthodichlorobenzene, either alone or as a solution of 5 per cent. or 10 per cent. in kerosene, kills the borers after one hour's exposure, and is particularly suitable for household furniture. Paradichlorobenzene is somewhat cheaper and, both in solution in kerosene and in crystalline form, has proved an effective deterrent for the treatment of timber in museum show cases. If the above are unobtainable, kerosene or turpentine may be used, applied freely at regular intervals and for a long time, as they are slow in action, or mercury bichloride dissolved in methylated spirit (0·2 per cent. solution), or a mixture of 1 oz. white arsenic and 2 oz. washing soda to 1 gal. boiling water. The larvae of all these borers can be killed at a temperature of 114°–117° F. in one minute ; French polish is not affected by this temperature. Polished, varnished or painted surfaces are best treated by injecting the liquid with a pump or syringe with a sharp-pointed nozzle ; two suitable ones are illustrated and described. While penetration is fairly rapid in sapwood, hardwoods often require a considerable time for penetration, and on a large scale dipping is the most effective method. Really effective penetration can only be assured by the use of a partial vacuum, followed by dipping in the liquid, as is done in the "full cell" creosote process. Even superficial penetration is very beneficial, for larvae working near the surface will be killed, while those working deeper in must come to the surface to complete development and will then die out. The quickest results are secured in early spring, when the larvae are working towards the surface.

Seasoning timbers are frequently attacked by shot-hole borers, chiefly of the genera *Platypus* and *Xyleborus*. They do not attack seasoned wood and cannot live in it, though their pin-holes are sometimes seen in wood that was infested while seasoning. The walls of the holes usually become dark in colour (owing to the action of a fungus), and when cut across often seem to be stained round the edge. All hardwoods used in constructional work are liable to attack, as well as many cabinet woods, but when pin-holes are not present to any extent, these timbers are far preferable to sapwood. In order to minimise attack, it is advisable to strip off the bark as soon as possible after the logs are felled, so that the surface may dry quickly and lose its attraction for the beetles, and it is essential that logs should be milled as quickly as possible after the felling of the trees. When logs are

once infested, the only effective treatment as yet tried is that of steaming in a steam box (which is illustrated) ; this method is being used by one firm in Sydney with great success, and apparently kills every borer in the timber, though it does not render it immune from further attack.

GURNEY (W. B.). **Insect Pests of Cotton in New South Wales.**—*Agric. Gaz. N.S.W.*, xxxiv, no. 12, pp. 887–893 ; xxxv, nos. 1, 2 & 6, pp. 49–55, 137–138, 422–428, 21 figs. Sydney, December 1923 ; January, February and June 1924.

About 30 species of insects have been found attacking cotton in New South Wales. These papers summarise the information at present known concerning the chief of them and suggest suitable control measures, the pests being dealt with in the order of their attack—on the seedlings, stems and leaves, blossoms, squares and bolls. General suggestions for control, and especially preventive measures, include winter ploughing, frequent and persistent cultivation, stubble and weed destruction, and early planting.

Seedling pests are *Aphis gossypii*, Glov., cutworms (particularly *Agrotis ypsilon*, Rott., and *Prodenia litura*, F.), and *Tetranychus bimaculatus*, Harvey (red spider). Of the other pests *Heliothis* (*Chloridea*) *obsoleta*, F. (cotton bollworm) is difficult to control, owing to its numerous food-plants. *Monolepta rosea*, Blackb., has a long adult life and survives the winter on wattle and pepper trees and sometimes destroys the whole blossom and foliage of cotton plants ; lead arsenate or calcium arsenate powder is recommended, while flares at night will attract and burn thousands of the beetles. *Epilachna vigintioctopunctata*, F. (28-spotted ladybird), which feeds on Cucurbits and *Solanum* spp., both in the larval and adult stages devours the epidermis of cotton leaves and should be checked by dusting the lower surface of the leaves with lead arsenate. *Nysius vinitor*, Bergr. (Rutherglen bug) has not as yet done much damage to cotton ; suggestions for keeping it down are to plough in or cut and burn grass and weeds on headlands in late winter or early spring, to keep this growth down during the first half of summer, and to dust infested plants frequently with slaked lime dust or to spray them with kerosene emulsion or nicotine sulphate. *Oxycarenus luctuosus*, Montrz. (coon bug) feeds on the seed and stains the lint, the remedies being clean cultivation and destruction of infested and worthless bolls. In cases of severe infestation of this pest or of the Rutherglen bug, a shallow tray of thin tar or of oil and water may be drawn between the rows while the plants are brushed over it. Other stainers are *Dysdercus cingulatus*, F. (red cotton bug) and *D. sidae*, Montrz. *Oncopeltus quadriguttatus*, F. (parti-coloured cotton bug) is widely distributed, but is only a minor pest. *Earias huegeli*, Rogenh. (green-striped cotton moth) feeds on cultivated cotton (*Gossypium*) and on the wild cotton bush (*Hibiscus*), the larvae attacking the terminals and flowers during the early part of the season and later on the squares and bolls. The mature caterpillar pupates either attached to the plant or boll where it has been feeding or in the soil or débris at the base of the plant. The irregular appearance of the generations and the fact that the caterpillar feeds hidden within the flowers or bolls render spraying difficult, though dusting with calcium arsenate powder can be successfully practised at times when the insect is feeding on exposed parts of

the plant, using 1 part of calcium arsenate to 5 to 10 of dry slaked lime. *Eucosma plebeiana*, Zell. (cotton tip moth) has recently been recorded as feeding and boring into the terminals and laterals, the small larvae thus destroying many leaf buds and crowns of stems and boring for short distances into the petioles of the leaves, causing shrivelling of the leaf buds and terminal leaves. In view of possible increase in the damage from this pest a further study is to be made of it and of possible remedies. *Cosmophila* (*Anomis*) *erosa*, Hb. (cotton semi-looper caterpillar) has only recently been found on cotton in New South Wales. Eggs are laid on the leaves and hatch in about four days, the larval stage occupying about 24 days and pupation taking place in a folded leaf. A Chalcid has been reared from the pupae which may prove useful in control. Arsenical dusts may be effective against the caterpillars.

Cooke (W. W.). **Spraying Vines with a Spray Gun.**—*Agric. Gaz. N.S.W.*, xxxvi, pt. 1, pp. 65–67, 3 figs. Sydney, January 1925.

As many orchards contain vines as well as fruit trees the manner by which a spraying outfit may be constructed so as to be used in a similar manner to a tractor for spraying the vines and then quickly changed to a form suitable for spraying trees is described and illustrated.

Bondar (G.). **As brocas do café.** [Coffee Borers.]—*Correio-Agric.*, iii, no. 1, pp. 11–13. Bahia, January 1925.

Brief notes are given on the following borers attacking coffee in Brazil: *Araecerus* (*Araeocerus*) *fasciculatus*, DeG., *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.), *S. fallax*, Costa Lima, and a Lepidopterous larva that occurs in stored coffee. *S. hampei* has not yet been observed in the State of Bahia.

de Azevedo (A.). **Como se vem combatendo o** *Stephanoderes coffeae* **Hag. broca do café paulista. Combate biologico ao mesmo bezouro.** [How *S. hampei*, Ferr., the Coffee Berry Borer in S. Paulo, is being combated. Biological Measures against this Beetle.]—*Correio-Agric.*, iii, no. 1, pp. 13–15. Bahia, January 1925.

The measures now being taken in the State of S. Paulo, Brazil, against *Stephanoderes hampei*, Ferr., have been already noticed from other sources. It is suggested that the two Hymenopterous parasites introduced into the Dutch East Indies from Uganda, *Prorops nasuta*, Wtrst., and *Heterospilus coffeicola*, Schmied., should be obtained.

Bondar (G.). **Lagarta minadora das folhas do algodoeiro,** *Acrocercops helicometra*, **Meyrick, sp.n.** [A Caterpillar Miner of Cotton Leaves, *A. helicometra*.]—*Correio-Agric.*, iii, no. 2, pp. 44–46, 2 figs. Bahia, February 1925.

The leaves of cotton in Bahia are often mined by the small caterpillars of *Acrocercops helicometra*, Meyr. The mature larva spins a white silk cocoon, the pupal stage lasting 6–7 days. The total development

requires about a month. The larvae are common from April to September on cotton, and have been also observed on *Gossypium brasiliensis* and *G. herbaceum*.

DE AZEVEDO (A.). **Insectos e Fungos.** [Insects and Fungi.]—*Correio-Agric.*, iii, no. 2, pp. 46–47. Bahia, February 1925.

This is a record of insects and fungi observed on cultivated plants in Bahia, including *Saissetia hemisphaerica*, Targ., on *Citrus*; *Hemichionaspis aspidistrae*, Sig., on ferns; *Coccus viridis*, Green, on *Lucuma cainito*; *Chrysomphalus perseae*, Comst., on orchids; *Aspidiotus simillimus translucens*, Ckll., on Anonaceae; *Icerya purchasi*, Mask., on roses, dahlias, etc.; *Aulacaspis pentagona*, Targ., on roses; the beetle, *Bruchus rufimanus*, Boh., in beans, *Phaseolus* sp.; *Heliothrips rubrocinctus*, Giard; *Stilothrips bondari*, Morg., on cotton bolls; and the Sphingid, *Protoparce paphus*, Cram., on tobacco foliage.

MACHADO (J. B. M.). **Instrucções para o expurgo de saccaria e café em côco.** [Instructions for the Disinfection of Coffee Bags and of unpulped Coffee.]—*Commiss. Estudo e Debellação da Praga Caféeira*, Publ. no. 7, 11 pp., 5 pls. S. Paulo, 1925.

Instructions are given to enable coffee growers to construct various sized chambers for fumigating empty coffee bags and harvested berries as brought in from the plantations. Carbon bisulphide, at the rate of 3 fluid ounces per 10 cubic feet of space, is the fumigant used, 15 hours exposure to it sufficing to destroy the coffee borer [*Stephanoderes hampei*], though the bags are usually left for 24 hours. The coffee berries should be contained in sacks and not heaped up in bulk, as in this form the circulation of the fumigant is impeded and the pulp of the berries in the lower layers is crushed.

DA COSTA LIMA (A. M.) & RAVACHE (A.). **A broca do café.** [The Coffee Borer.]—*Bol. Minist. Agric., Ind. e Comm.*, xiv, no. 1, pp. 39–42. Rio de Janeiro, January 1925.

The authors have compiled regulations for the government of the Brazilian State of Minas Geraes, which is threatened by the coffee berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.). The text of these is given. One section covers the general measures to be taken in the coffee districts of the State, especially those bordering on São Paulo, where a serious infestation already exists, the other comprises measures required in infested areas or in areas believed to be infested.

BRÈTHES (J.). **Quelques insectes du Paraguay.**—*Rev. chil. Hist. nat.*, xxviii, pp. 67–72. Santiago, 1924. [Received 23rd March 1925.]

The Anobiid beetle, *Cathorama gossypii*, sp.n., is described from Peru, where it attacks cotton seed.

The Hymenoptera, *Apanteles paraguayensis*, sp.n. (a possible parasite of *Pseudococcus citri*), *Leptomastidea pseudococci*, sp.n. (a parasite of *P. citri*), and *Colastes testaceus*, sp.n. (a parasite of *Icerya purchasi*), are described from Paraguay.

Ruiz P. (F.). **Notas biologicas sobre algunos insectos chilenos.** [Biological Notes on some Chilean Insects.]—*Rev. chil. Hist. nat.*, xxviii, pp. 76–80, 1 fig. Santiago, 1924. [Received 23rd March 1925.]

The Lucanid beetle, *Sclerognathus bacchus*, Hope, mines in *Nothofagus obliqua* in Chile, causing a great loss of sap in this tree.

Porter (C. E.). **Nuevo huesped de un Tisanoptero.** [The New Host of a Thysanopteron.]—*Rev. chil. Hist. nat.*, xxviii, p. 97. Santiago, 1924. [Received 23rd March 1925.]

The walnut, *Juglans regia*, is recorded here as a new food-plant of *Heliothrips haemorrhoidalis*, Bch., in Chile.

Porter (C. E.). **Tres "pololos" chilenos perjudiciales a la agricultura.** [Three Chilean Beetles injurious to Agriculture.]—*Rev. chil. Hist. nat.*, xxviii, pp. 115–125, 4 figs. Santiago, 1924. [Received 23rd March 1925.]

The three Melolonthid beetles dealt with are *Phytoloema herrmanni*, Germain, and *Athlia* (*Rivera*) *plebeja*, Burm., both of which in the larval stage are pests of wheat, and *A. rustica*, Erichson, the adults of which attack the grape vine. The adults of *P. herrmanni* appear in spring at the end of September or in October. The larvae reach maturity in July, descend to a depth of 12–16 inches in the ground and pupate in August. In compact soils of volcanic ash the injury may be less than 1 per cent. of the crop, but in loose soils 15–20 per cent. injury may occur. As the females choose for oviposition places with abundant vegetation, the remedy suggested is to let the land lie fallow at the period when the adults appear.

A. plebeja mates in November, oviposition occurring from the second half of December up to January, from 4 to 20 eggs being laid. After a short period the larva hatches and begins feeding on the roots of various plants, especially wheat. It does much damage in loose soils and remains at a depth of ½–2 inches. For pupation early in October it descends to a depth of 5 or 6 inches in damp earth. In years favourable to it more than 60 per cent. of the wheat is said to be destroyed, whereas after a dry spring the damage does not exceed 2–3 per cent. By letting the land lie fallow in the second half of October the pupae will be killed by the dryness of the soil.

The adults of *A. rustica*, like the other beetles of this type attacking the vine, may be collected in the morning.

Reyne (A.). **Verslag van den Entomoloog.** [Entomologist's Report.] —*Dept. Landbouw. Nijv. & Handel Suriname, Verslag 1923*, pp. 35–48. Paramaribo, 1924. [Received 20th March 1925.]

A sugar-cane froghopper, *Tomaspis tristis*, F., proved very harmful on one estate, the crop loss in some of the fields amounting to 20 per cent. [*cf. R.A.E.*, A, v, 166]. Hand catching was practised against the adults, and the fields were burnt over just before cutting so as to destroy the larvae, which live above ground. The general occurrence of sugar-cane mosaic led to an investigation as to the identity of the Aphid found on *Sorghum* and on wild grasses; it proved to be *Aphis maidis*, Fitch. The author has never observed it actually on sugar-cane.

The green coffee scale, *Coccus* (*Lecanium*) *viridis*, Green, occurred sporadically on young plants, but was far more harmful in old plantations where there are numerous nests of an ant, *Dolichoderus* sp., the nests of which also harbour the scale-tending ant, *Cremastogaster*.

A spray of 8 per cent. fruit-tree carbolineum cleared off 76 per cent. of *C. viridis* infesting young orange plants, but failed as regards *Aspidiotus articulatus*, Morg.

Spotting of banana fruit is due principally to bees, but a Chrysomelid beetle, *Colaspis* sp., also causes this defect. Coconut palms and Royal palms (*Oreodoxa*) were defoliated by *Brassolis sophorae*, L., the only effective remedy being the removal by day of the caterpillar nests.

The caterpillars of *Diaphania nitidalis*, Stoll, attacked melons and those of *Pyroderces* sp. occurred on sea island cotton. A sample of *Sesamum* seed was found to contain *Calandra oryzae*, L., *Tribolium castaneum*, Hbst. (*ferrugineum*, F.), *Lophocateres pusillus*, Klug, and *Thoractides heydeni*, Reitt., the last-named being hitherto known only from southern France and northern Africa.

Mosaic Disease.—*Jl. Jamaica Agric. Soc.*, xxix, no. 2, p. 81. Kingston, February 1925.

According to law no maize or guinea-corn may now be grown within 200 yards of any sugar-cane field, as they are suspected of being carriers of mosaic disease. Experiments on this point are being conducted. A list is given of nine graminaceous plants, including maize, found in Jamaica, that are known to be susceptible to mosaic disease of sugar-cane, and of two that are suspected of being so.

Evans (H. H.). **Oil Sprays in Pest Control.**—*Agric. Jl. Dept. Agric. Br. Columbia*, x, no. 1, pp. 4, 5, & 19, 2 pls. Victoria, B.C., March 1925.

The use of oil sprays in Western Canada is of quite recent date and has yielded varying results in the control of scale-insects and pests that occur during the dormant period of tree growth in the egg stage on exposed surfaces. Owing to the presence of fruit-tree leaf-roller [*Tortrix argyrospila*] and blister-mite [*Eriophyes pyri*] in many of the orchards, and the fact that an oil spray is necessary for efficient control of the former and lime-sulphur for the latter, a demand has arisen for an oil spray that will combine safely with lime-sulphur. Miscible oil sprays with much soap as a unit of the emulsifying agent, though effective in the control of certain pests, cannot be used in combination with lime-sulphur, and are also troublesome where hard and alkaline waters have to be used. Proprietary brands of the cold-mix oil sprays are now appearing on the market that will safely combine with lime-sulphur and almost any type of water. Home-made cold-water emulsion formulae that can be combined with lime-sulphur, although apparently cheaper than the proprietary brands and of apparent value, are at present too uncertain and unsafe for general use.

Brittain (W. H.). **Report of the Professor of Entomology and Zoology and Provincial Entomologist.**—*Ann. Rept. Secy. Agric., Nova Scotia, 1924*, pp. 50–59. Halifax, N.S., 1924. [Received 8th April 1925.]

The work in connection with the brown-tail moth [*Nygmia phaeorrhoea*, Don.] is reported on by L. S. McLaine; only 70 nests

were collected in 1923 as against 492 in the previous year [*R.A.E.*, A, xii, 205]. *Phorbia* (*Chortophila*) *brassicae*, Bch., was unusually abundant on field turnips in widely separated localities. Other pests of importance in the field are the zebra caterpillar [*Mamestra picta*, Harr.]; and *Gortyna micacea* (potato stem borer), locally causing serious injury to rhubarb.

An unusual outbreak of *Eucosma* (*Tmetocera*) *ocellana*, Schiff. (bud-moth) occurred in many orchards, the loss in some cases amounting to 75 per cent. of the crop. Other orchard pests occurring in unusual abundance were *Lygus communis*, Knight (green apple bug), *Alsophila pometaria*, Harr. (canker worm), *Paratetranychus pilosus*, C. & F. (European red mite), and *Anuraphis roseus*, Baker (rosy aphis).

VIERECK (H. L.). **The Identity of** *Platycampus victoria*, **MacGillivray. (Tenthredinidae, Hymenoptera.)**—*Canad. Ent.*, lvii, no. 2, p. 43. Orillia, Ont., February 1925.

As the identity of *Platycampus victoria*, MacGill., reared from larvae on *Populus nigra* var. *italica* (Lombardy poplar) was in doubt, a female paratype of this species has been examined, and is considered to be without doubt a female of *Trichiocampus viminalis*, Fall. This sawfly was probably introduced directly from Europe into British Columbia, as there seems to be no record of its occurrence elsewhere in North America excepting Ontario, New York and Connecticut, where it occurs on poplars.

FERRIS (G. F.). **Observations on the Chermidae (Hemiptera ; Homoptera). Part ii.**—*Canad. Ent.*, lvii, no. 2, pp. 46–50, 3 figs. Orillia, Ont., February 1925.

In this second instalment of this work on PSYLLIDAE [*R.A.E.*, A, xii, 54] descriptions are given of the nymphs of *Trioza urticae*, L., and of *Paratrioza cockerelli*, Sulc., these species being types of their respective genera, and of *Psylla* (*Psyllia*) *alni*, L., which may or may not be the type of its genus, depending upon the view taken of a nomenclatorial difficulty.

SWAINE (J. M.). **A New Species of** *Polygraphus* **(Coleoptera).**—*Canad. Ent.*, lvii, no. 2, p. 51. Orillia, Ont., February 1925.

Polygraphus hoppingi, sp.n., is described from *Picea engelmanni* in the San Francisco mountains of northern Arizona.

COMSTOCK (J. H.). **An Introduction to Entomology.**—8vo, xix+1044 pp., 1228 figs. Ithaca, N.Y., The Comstock Pubg. Co., 1924. Price $6.00.

This is the first complete edition of this work, and incorporates the third edition of Part I, the second edition of which has already been noticed [*R.A.E.*, A, xii, 77], the more important amendments to this part being with reference to the external anatomy, and the transfer of the bibliography to the general one (20 pp.) for the whole volume.

Part II (pp. 209–990) presents a comprehensive and authoritative account of the classification (25 orders are recognised) and life-histories of American insects.

Representing as it does the culmination of its distinguished author's study of the subject for nearly fifty years, this volume will doubtless prove of the greatest service in providing the student with a very sound grounding in the elements of entomology, and at the same time serving as a standard treatise.

FELT (E. P.). **Key to Gall Midges (A Résumé of Studies i-vii, Itonididae).** —*N. Y. State Mus. Bull.*, no. 257, 239 pp., 8 pls., 57 figs. Albany, N.Y., February 1925.

This bulletin contains Part VIII of the series on gall-midges [*cf. R.A.E.*, A, x, 249], which enumerates the more striking and important facts concerning the CECIDOMYIIDAE (ITONIDIDAE) from the economic, biological and systematic aspects. The key to the genera and the extensive bibliography make it relatively easy to look up the much scattered literature of this large group. An index to the whole series is appended.

SCHOTT (F. M.). **Notes on Lepidoptera and Hymenoptera.**—*Jl. N. Y. Ent. Soc.*, xxxiii, no. 1, pp. 53–56. Lancaster, Pa., March 1925.

From the present occurrence of *Hemerophila pariana*, Clerck (apple and thorn skeletoniser) in New York and New Jersey, it would seem that it may ultimately spread over a considerable area in the East. Five Hymenopterous parasites not previously recorded [*R.A.E.*, A, xi, 382] were observed, but it is not certain whether any connection exists between them and any stages of *H. pariana*. The Reduviid, *Sinea spinipes*, H.S., was found feeding on the larvae. It is suggested that "flit moth" or "apple flit moth" would be a more suitable popular name for *H. pariana*.

The larvae of *Tortrix pallorana*, Rob., have caused considerable damage to rose foliage in New Jersey; an Ichneumonid parasite, *Campoplex ferrugineipes*, Ashm., was reared from them.

Larvae of the Tortricid, *Argyroploce* (*Olethreutes*) *hebesana*, Wlk., occurred in the terminal shoots of *Physostegia* sp., causing withering and blackening of the foliage. Galleries of *A.* (*O.*) *hemidesma*, Zell., were abundant in *Spiraea*; this moth is parasitised by *Epiurus* sp.

MCATEE (W. L.). **Notes on Eupterygid Leaf-hoppers with Descriptions of a few Forms (Homoptera).**—*Florida Ent.*, viii, no. 3–4, pp. 33–39, 2 figs. Gainesville, Fla., December 1924. [Received 23rd March 1925.]

Notes on distribution are given that considerably extend the known ranges of the species mentioned. New forms described include *Erythroneura comes* var. *bidens* n., on *Pinus virginiana* in Virginia.

WATSON (J. R.). **Additions to the Thysanoptera of Florida—xii.**—*Florida Ent.*, viii, no. 3–4, pp. 50–52. Gainesville, Fla., December 1924. [Received 23rd March 1925.]

The species dealt with include *Eurythrips osborni*, Hinds, from *Eupatorium serotinum* in bloom; *Taeniothrips* (*Physothrips*) *xanthius*, Williams, from Cynipid galls in pigeon plums [*Coccolobis laurifolia*] (hitherto known and described only from *Cattleya* orchids from

Trinidad); *Microthrips piercei*, Morg., on *Cassia siamea*; and *Scirtothrips owreyi*, sp.n., described from two females collected from *Iris trifoliata*.

Orchard Spray Program for 1925.—*Univ. Delaware School Agric.*, Extens. Circ. 18, 8 pp. Newark, Del., January 1925.

Instructions are given for the spraying of apples, peaches, and grapes, as well as for the preparation of various home-made sprays.

McDaniel (E. I.). **Treatment for Red-spider.**—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vii, no. 3, p. 108. East Lansing, Mich., February 1925.

Red spider [*Tetranychus telarius*, L.] infesting plants under glass may be controlled by spraying with lemon oil (a proprietary substance) at standard strength three days in succession. Other sprays would probably prove just as effective if applied three or possibly four times to ensure reaching the mites during a period of activity, as they are not so susceptible to sprays during the torpid or quiescent periods.

Gentner (L. G.). **The Mint Flea-beetle** *Longitarsus menthae*.—*Qtrly. Bull. Michigan Agric. Expt. Sta.*, vii, no. 3, pp. 109–110, 2 figs. East Lansing, Mich., February 1925.

During the summer of 1924 considerable injury to peppermint and spearmint in southern Michigan was caused by *Longitarsus menthae*, sp.n., of which a detailed description will be published later. The larvae feed on the rootlets and mine in the main roots and lower parts of the stems in June, causing stunting of the plants, or killing them outright. The first adults appear in the latter half of July and feed on the mint leaves, causing them to turn brown and drop off. After feeding for three or four weeks, the eggs are laid near the surface of the soil. Oviposition continues until the adults die or severe cold weather sets in. As a result of ploughing under in the autumn the eggs are protected during the winter months. Mint planted on summer-fallowed or clean-cultivated land is not attacked during the first year, but the adults from adjoining fields soon migrate to the new mint and lay their eggs on it. This migration might possibly be prevented by dusting a strip around the edge of the field with 1 part of calcium arsenate to 20 parts of finely powdered raw gypsum. As few eggs are laid before the mint is cut for distilling, it may be possible to kill the adults before the eggs are laid by dusting the second growth and remnants in infested fields soon after harvest. Natural breeding-places in the form of self-sown mint should be destroyed.

Atanasoff (D.). **The** *Dilophospora* **Disease of Cereals.**—*Phytopathology*, xv, no. 1, pp. 11–40, 9 figs. Lancaster, Pa., January 1925.

On cereals and grasses attacked by *Dilophospora alopecuri*, recorded from various countries in Europe from Wisconsin, are always to be found galls made by *Tylenchus tritici*. The fungus is only able to establish itself successfully on plants already suffering from Nematode attack, and only so long as the Nematodes are present in the plants,

the spores of the fungus apparently being able to reach the growing point of the plant only by being carried along by the Nematodes. The relation between the Nematodes and the fungus is an extremely intimate one, since merely placing the fungus spores on the growing point of plants free from Nematodes failed to produce the disease. A combination of Nematode and fungus attack, under favourable conditions, may completely ruin a crop. For the Nematodes this co-parasitism is decidedly harmful, the fungus being an important factor in checking the Nematode, since the galls become overgrown by the fungus and destroyed. Under normal conditions the young plants show the first symptoms of Nematode attack when in the third or fourth leaf, the upper leaves becoming wrinkled and distorted. To prevent infestation by both the fungus and the Nematode, clean seed should be used from uninfected fields. Good seed may be separated from infested seed by stirring it in a 20 per cent. solution of common salt, or better, of potassium chloride, when the gall-infested seed will rise to the surface and may be skimmed off. To prevent the Nematodes or their galls from reaching the fields with straw or stable manure, no infested grain or straw should be used as animal food, or the manure of animals so fed should not be applied to fields that are to be planted with wheat, rye or spelt. No surface water should be allowed to pass from infested to uninfested areas, and deep ploughing under of the stubble just after harvesting lessens the spread of the disease to neighbouring fields. Since most of the lighter galls are blown away in the straw during the threshing, the straw of infested fields should be burned on the place of threshing, and as soon as this is finished. No susceptible crops should be grown on the same field for at least a year. Lengthening this period to two or three years will completely eliminate the infestation.

Modification of Nursery Stock, Plant and Seed Quarantine Regulations. Amendment No. 3 of Revised Rules and Regulations Supplemental to Notice of Quarantine No. 37.— *U.S. Dept. Agric., Fed. Hortic. Bd.*, 1 p. Washington, D.C., 10th January 1925.

Regulation 2 of the Rules and Regulations of Quarantine No. 37 [*R.A.E.*, A, xi, 369] is amended to allow for the importation without permit, but subject to any safeguards prescribed, of plant products capable of propagation, imported for medicinal, food or manufacturing purposes, and field, vegetable and flower seeds, except products and seeds governed by special quarantines, when free from sand, soil, or earth.

Modification of Fruit and Vegetable Quarantine. Amendment No. 3 of Regulations Supplemental to Notice of Quarantine No. 56.— *U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 10th January 1925.

This makes a slight alteration to Amendment No. 2 [*R.A.E.*, A, xii, 117] in regard to dried, cured, processed fruits and vegetables, nuts, dried beans, peas, etc., which may be subject to entry under permit, if it is determined by the Secretary of Agriculture that the condition of drying, etc., to which they have been subjected may not entirely eliminate risk.

Modification of Fruit and Vegetable Quarantine. Amendment to No. 4 of Regulations Supplemental to Notice of Quarantine No. 56.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 2 pp. Washington, D.C., 6th February 1925.

A further slight alteration is made to Amendment No. 2 [*R.A.E.*, A, xii, 117] in regard to the additions and exceptions, authorised for certain countries, to the fruits and vegetables listed, for which the issue of permits may be conditional on presentation of evidence that they are not attacked in the country of origin by injurious insects.

McDonnell (C. C.) & Nealon (E. J.). **The Deterioration of Soap-Nicotine Preparations.**—*Indust. & Engin. Chemistry*, xvi, no. 8, pp. 819–821. Washington, D.C., 1st August 1924.

Since nicotine volatilises more or less rapidly from many of the commercial preparations containing it, experiments have been made to determine whether shortage of it was due to volatilisation or decomposition or to the fact that the amount of nicotine claimed had never been present. A number of soaps were prepared by different formulae, and packed in various containers. The results showed that hard soaps, made from sodium hydroxide, menhaden fish-oil and free nicotine solution, lost nicotine rapidly on storage regardless of the type of package. Potash soaps (soft soap) and soft soda soaps containing nicotine retained practically their original nicotine content for a period of four years. The indications are that the change in the nicotine depends on the physical condition of the soap and not on excess of alkali, the kind of alkali, the use of heat in the preparation of the mixture, or on the type of package. The decrease in nicotine content in the hard soaps was obviously not due to loss of nicotine by volatilisation but to chemical changes by which it was converted apparently into insoluble polymeric form, or a condensation product. The fact that the decrease in nicotine was accompanied by a decrease in the fatty acids of the soap is an indication that there is probably some reaction between the two. Stable fish-oil soap nicotine preparations can therefore be made, though apparently not in cake form. The cake form is more satisfactory for packing and transport, but on the other hand the soft soap will dissolve in water much more readily and is therefore more desirable for the consumer. Experiments are now being made to determine whether or not soaps made from fats and oils other than fish-oil with which nicotine is incorporated will behave in the same manner, and also to obtain more information with respect to the composition of the resinous material formed.

Haywood (J. K.). **Report of the Insecticide and Fungicide Board.**—*U.S. Dept. Agric.*, 6 pp. Washington, D.C., 1924. [Received 17th March 1925.]

The work of the Board during the year ended 30th June 1924 is reviewed. Particular attention has been given to the analysis of preparations said to be effective against insect parasites and pests, and to a campaign against adulterated and misbranded disinfectants of all kinds. A great improvement has been brought about in the labelling of disinfectants in general. The investigations to determine the active principles of the seeds of two species of larkspur (*Delphinium*

consolida and *D. staphasagria*) were continued, and the physical and chemical properties of the pure oil obtained from the former have been determined. The yield of oil was 25 per cent. of the weight of the seed. Three alkaloids were isolated in crystalline form, and the composition of two of them was definitely established. They are delcosine (empirical formula $C_{21}H_{33}NO_6$, melting point 198–199° C. or 388·2 to 390·1° F.) and delsoline (empirical formula $C_{25}H_{41}NO_8$, melting point 207–209° C. or 404·3 to 408·1° F.). The third alkaloid has not yet been sufficiently purified to determine its formula or physical constants. These oils and alkaloids are being tested against various insects, and similar investigations with *D. staphasagria* are now in progress. Experiments with nicotine-soap preparations are described [see preceding abstract] as well as a study of the loss of nicotine from dusts during storage, and a method for the determination of free lime in calcium arsenate has been developed [see next abstract].

Smith (C. M.) & Hendricks (S. B.). **The Determination of Free Calcium Hydroxide in Commercial Calcium Arsenate.**—*Indust. & Engin. Chemistry*, xvi, no. 9, pp. 950–951. Washington, D.C., September 1924.

A method that has been devised for estimating the quantity of free lime present in calcium arsenate, as used for the control of cotton boll weevil [*Anthonomus grandis*, Boh.], is described in detail.

The results, which are shown in tables, give the quantity of calcium hydroxide present with an average error of about 0·02 per cent. The results obtained from commercial samples were practically as satisfactory as those obtained when mixtures made from pure compounds were used. This method does not work so smoothly in the presence of magnesium compounds, and as commercial calcium arsenates sometimes contain a sufficient amount of them to affect the results, it is hoped to modify the method to include products containing them.

Thomas (F. L.) & Rude (C. S.). **i. Foulbrood Control and Diseases of Bees. ii. Foulbrood Law and Revised Regulations.**—*Texas Agric. Expt. Sta.*, Circ. 36, 24 pp., 1 pl., 2 figs. College Sta., Texas, August 1924. [Received 30th March 1925.]

This circular contains a report of the inspection work carried on under the [American] Foulbrood Law of Texas from 1910 to 1923. Descriptions of the more important brood diseases and adult diseases of bees are also given, as well as comparisons of the brood diseases in order to facilitate identification.

Phillips (E. F.). **The Bee-louse,** *Braula cocca*, **in the United States.**—*U.S. Dept. Agric.*, Dept. Circ. 334, 11 pp. Washington, D.C., February 1925.

In view of the presence of *Braula coeca*, Nitzsch (bee-louse) in Maryland, where it has occurred for several years, a good deal of information regarding it has been collected in this circular, much of which has been already noticed [*R.A.E.*, A, ix, 568, etc.]. Perez has observed the feeding of this parasitic fly and records that it merely irritates the bee's mouth with motions of its feet until the buccal organs

slightly open and release a small drop of honey, which it immediately sucks up. This method of feeding has been described in greater detail by Losy, who states that the parasites are mostly on the queen and migrate to the workers when they undertake the feeding of the larvae, *B. coeca* nibbling at the food which is conveyed to the brood. As soon as this is ended, they are all found on the queen, where mating occurs, and by the end of November they are so numerous that the queen becomes weakened and dies in late autumn. Various remedies are quoted [*R.A.E.*, A, xiii, 97, etc.], fumigation methods being chiefly resorted to because the parasite is believed to succumb to fumigation before the bees do. A safe method recommended is to open the infested colony in the evening and sprinkle thoroughly with honey water. In cleaning up the dilute honey the bees are said to remove the parasites. These methods have not yet been tested in the United States. While little damage seems to be done in Maryland, it is impossible to foresee what effect the presence of the parasite might have in other parts of the country, and every effort should be made to eradicate it while the infested area is still small.

Burgess (A. F.). U.S. Bur. Ent. **Our Association.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 43–62. Geneva, N.Y., February 1925.

The objects, purposes and accomplishments of the American Association of Economic Entomologists are traced since its foundation. Some of the ideals that should animate its membership and the activities of the organisation that should be developed in the future are also mentioned.

McColloch (J. W.). **The Hessian Fly Problem in Kansas.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 65–69. Geneva, N.Y., February 1925.

In considering the problem of the Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, in relation to the wheat industry of Kansas, emphasis is placed on the fact that this midge is only one factor influencing the production of wheat. Figures are given showing that the average annual loss to wheat due to insect pests, of which the Hessian fly is only one, is insignificant in comparison with other factors. The control of this insect is influenced by wheat acreage, agricultural practices, varieties of wheat, climatic conditions, etc. The problem calls for co-operation with other sciences, especially agronomy.

Hill (C. C.) & Smith (H. D.). U.S. Bur. Ent. **The Relation of Hessian Fly Damage to Yield.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 69–73. Geneva, N.Y., February 1925.

This paper discusses the various ways in which the Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say, damages wheat and reduces its yield. The injury may be of four different types: Damage to the young plant during the autumn season, prevention of heading caused by the spring generation of the fly during the spring season, damage near harvest time caused by mechanical injury to the stalk by the presence of the fly larva, and loss of weight in the grain due to damage from the feeding of the larvae during the spring and early summer. A series of experiments is given in tabular form, showing the loss of

weight per head for each additional fly larva in the culm, and a comparison is made between the weight of yield of fly-free wheat and that of fly-infested wheat, in which all factors affecting yield other than the Hessian fly are eliminated.

GRANOVSKY (A. A.). **The Organised Co-operative Campaign against Grasshoppers in Wisconsin.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 73–83. Geneva, N. Y., February 1925.

This paper records the successful methods used in the co-operative control of grasshoppers on a large scale in Wisconsin by the poisoning of all waste lands and breeding-places with arsenical bait. The clear-winged locust, *Camnula pellucida*, Scudder, is the most numerous and most injurious of any species of grasshopper, especially in the northern parts of the State. Waste land is particularly adapted for the breeding of grasshoppers, and the study of breeding grounds showed that *C. pellucida* is widely distributed over soils of a sandy loam type. Details of four formulae for arsenical baits are given, and it was found that the following had all the advantages of the others, and several additional ones, besides being more than four times as cheap as the U.S. Standard formula : 100 lb. sawdust, 1 U.S. qt. sodium arsenite, 5 lb. salt, 1 U.S. gal. black strap molasses, and 10 U.S. gals. water, the quantity per acre being 10 lb., and the cost per acre about 4d. Black strap molasses was used to counteract the fresh odour of the sawdust and keep the bait moist longer, but its value is doubtful. One of the essential features of the plan of campaign is the poisoning of all waste land, pastures, fence lines, roads and other infested areas, before migration of the grasshoppers begins in the spring, followed by a second poisoning where necessary. The campaign was conducted from 27th June to 18th July 1924, with the co-operation of farmers and others. Poisoned bait was spread where sheep and cattle were confined without any casualty traceable to the poison distributed. Sawdust is not an attractive food for animals, but the use of bran might have resulted in cattle mortality. As a result of the campaign crops worth more than £40,000 were saved from grasshopper destruction. Though it was originally intended to make a second application of bait over the entire area, this proved unnecessary, except in one township. Field tests were made at the time of the campaign, and the efficacy of the bait proved to be from 86 to 93 per cent. One more year of organised effort will be necessary to reduce the grasshoppers to negligible numbers.

REEVES (G. I.). U.S. Bur. Ent. **The Arsenical Poisoning of Live-stock.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 83–89. Geneva, N.Y., February 1925.

Recommendations for the spraying of lucerne to control the alfalfa weevil, *Hypera* (*Phytonomus*) *murina*, F., have been guided largely by the work of Dr. H. C. Gardiner on the arsenical poisoning of domestic animals. It deals with the tolerance of farm animals for arsenic and describes the symptoms of arsenical poisoning and the lesions produced by it, and is based on an extended series of feeding experiments, accompanied by clinical observations and followed by autopsies. He proved that horses and cattle can take, without any external evidence of injury or any alteration discernible upon a careful postmortem

examination, from 20 to 30 grains of arsenic daily, for an indefinite period. Sheep are more easily poisoned, requiring only from 4 to 8 grains daily. The fatal dose for horses and cows is 300 grains. The dangerous dose was shown to be far greater than the amount that is contained in a feed of sprayed hay.

LANE (M. C.). U.S. Bur. Ent. **The Economic Wireworms of the Pacific Northwest (Elateridae).**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 90–95. Geneva, N.Y., February 1925.

The three species of wireworms of principal economic importance in Washington, Oregon, and Idaho are the inflated wireworm, *Ludius inflatus*, Say, the dry-land wireworm, *L. noxius*, Hyslop, and the wet-land wireworm, *Pheletes occidentalis*, Candeze.

L. inflatus is the most injurious species in the region bordering on the mountains, which has a rainfall of from 18 to 20 inches. It causes serious injury to wheat plants during March, April and May. Summer fallowing of land every other year, keeping it free from all plant growths for one season, preserves the moisture and nitrates and helps to eliminate a great many wireworms. The life-history of *L. inflatus* is substantially similar to that of *L. noxius*, though their habitats are more or less distinct.

L. noxius is chiefly found in the region with a rainfall of from 10 to 18 inches annually, now largely broken up for the production of winter and spring wheat, under strict summer-fallow methods. It is a native of the sage-brush and bunch-grass lands, and is never found in regions with more than 15 inches of rainfall, but its food-plants now include wheat and other grains. On the advent of hot weather its activity ceases, and it descends deeper into the soil and suspends feeding till the following spring. The total life-cycle is not less than four years from egg to final adult emergence. The female adult has never been observed in flight, and probably remains under clods till mating has taken place, when she burrows in the soil and deposits her eggs at a depth of at least six inches. The average number of eggs laid by one female was 382. Under laboratory conditions a period of 23 days elapsed between mating and the first oviposition. The larvae hatch during the latter part of June and feed on sprouting grain. Moulting does not seem to take place during the active feeding season. The average number of moults is two, though some individuals moult three or four times. Larvae starved throughout the season under laboratory conditions moulted the same number of times as those fed normally, and, after several years without food, some became adults. The vital period is during the first season after hatching, as the larvae must have growing succulent food during July and August in order to survive under the very dry conditions of their native habitat at this season. Nearly every bad case of wireworm infestation has been traced back to a time when the summer-fallow was allowed to become very weedy.

P. occidentalis, which occurs in the region with a normal rainfall of less than 10 inches, differs considerably from the other two. It is a native of the three States, wherever there are swampy places near streams and lakes, and also on the humid coastal region west of the Cascade Mountains. It did little damage until irrigation was introduced, and then not until the land had been thoroughly soaked and cultivated for years. The female flies freely and lays only slightly fewer eggs than the dry-land wireworm. It feeds on a variety of

crops, including potatoes, maize, root crops, cereals, lucerne, and nursery stock. It destroys apple, pear, peach and other seeds in early spring, before they sprout, cuts off the tender seedlings after sprouting, eats out the lower buds and finally, by girdling, kills one- and two-year-old grafted stock.

McLaine (L. S.) & Crawford (H. G.). **The Status of the European Corn Borer in Ontario (1924).**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 95–98. Geneva, N.Y., February 1925.

The European corn borer, *Pyrausta nubilalis*, Hb., was discovered in Ontario in 1920, and now infests the main maize-growing sections. In estimating the damage done, it must be taken into account whether the maize is grown for fodder, grain, or seed. Fodder maize may have 75 per cent. of the stalks broken, but the actual farm loss would probably be less than 25 per cent. In maize grown for grain the loss would be higher owing to the injured stalks affecting the development of the ear, and in the case of seed the crop might easily be a total loss, especially where seed on the cob is required. The rate of increase in some areas has been largely due to the way the maize is handled; few stalks are cut, and ploughing does not usually take place until the following summer. If the rate of increase continues and there is no modification of farm practice, commercial maize growing will have to be abandoned. The utilisation of mechanical contrivances for the destruction of the refuse after the grain is harvested is essential.

Caffrey (D. J.). U.S. Bur. Ent. **Status of the European Corn Borer in the United States in 1924.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 98–109. Geneva, N.Y., February 1925.

During 1924 the European corn borer, *Pyrausta nubilalis*, Hb., increased the area of its distribution in the United States from 16,052 to 24,773 square miles, an increase of 54·33 per cent. The greater part of this dispersion occurred in the Lake Erie–Lake Ontario section of the States of Michigan, Ohio, Pennsylvania and New York. The increases in the single-generation western areas are thought to be attributable to favourable weather conditions, while the decrease in the two-generation area of New England is probably due to the effect of unfavourable weather conditions in 1923 and 1924 and the very thorough cleaning and ploughing operations of practically 90 per cent. of the maize fields under the stimulus of the Massachusetts State law. Cage experiments and field observations in Ohio showed a larval survival of 10 per cent. based upon the number of eggs deposited. Continued studies showed the necessity of cutting stubble low as early as possible, as the percentage of larvae left in 6-inch stubble from stalks cut early in November was three times greater than in stubble of the same height cut in the middle of September. Varieties of maize with large stalks and ears exhibited a greater resistance to severe injury by the corn borer than varieties with small stalks and ears. In Ohio and Michigan the percentage of stalk infestation in sweet maize was slightly greater than in field maize, while the number of larvae in the former was more than double that in the latter. In the same area very little damage took place in fields of sweet or field maize planted after the first week in June. Early sweet maize as a trap crop failed under 1924 conditions. Experiments indicate that clean ploughing in the late

autumn is to be recommended for infested crops that cannot be dealt with by burning or feeding. A 2 per cent. free nicotine dust gave encouraging results in 1924 when applied at the period of maximum egg hatching.

A total of 1,106,926 foreign parasites, consisting of seven different species, *Zenillia roseanae*, B. & B., *Eulimneria crassifemur*, Thom., *Angitia punctoria*, Roman, *Habrobracon brevicornis*, Wesm., *Exeristes roborator*, F., *Microgaster tibialis*, Nees, and *Phaeogenes planifrons*, Wesm., have been liberated in the United States since 1919. Two of these, *E. roborator* and *M. tibialis*, have been recovered in the field.

Huber (L. L.) & Neiswander (C. R.). **On Certain Behaviour of the European Corn Borer** (*Pyrausta nubilalis*, **Hubn.**).—*Jl. Econ. Ent.*, xviii, no. 1, pp. 109–111. Geneva, N.Y., February 1925.

This paper offers preliminary evidence of what may happen to the European corn borer, *Pyrausta nubilalis*, Hb., after the thorough ploughing of a field where not only is all fodder buried but the stems and roots of grasses are also well covered. It is known that a few days after ploughing practically all the borers come to the surface, and though some migrate or are destroyed by predacious enemies, many remain in the field. Experiments were carried on with more than 270 corn borer larvae, which were confined in wire cloth cages before and at the regular time for natural pupation. In each cage was a group of clods and a quantity of sand. The borers, therefore, could pupate either in the sand, in or under the clods, or on the sides of the cages. A comparatively large number pupated in the clods and sand, and some of these emerged as adults, one of which deposited a total of 659 eggs.

Flint (W. P.) & Compton (C. C.). **A New Method for Controlling the Onion Maggot.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 111–116. Geneva, N.Y., February 1925.

During the past seven years experimental work has been carried on in Cook County, Illinois, for control of the onion maggot, *Hylemyia antiqua* (*Phorbia ceparum*), as the loss from this fly amounts on an average to between 10 and 15 per cent. of all set onions grown, and the damage may reach 35 to 50 per cent. of the crop. The general method of procedure has been to apply the insecticide directly to the young onions in the row, making from three to five applications. The applications of dust were made with hand dusters and that of liquids in a fine stream through a small hose. In the tests in 1922 mercury bichloride in solution, alone, or with Bordeaux, and Bordeaux mixture alone, gave the best results. Three tables are given showing the results of experimental work in 1922, 1923 and 1924. In 1923 several new materials were used, including Bordeaux lubricating oil emulsion (boiled lubricating oil emulsion 2 per cent. in 4–4–50 Bordeaux mixture), which, however, had no marked effect in reducing oviposition of the flies on the sprayed onions. Treatment of the eggs and larvae of different sizes showed a high percentage of destruction from both Bordeaux oil emulsion and mercury bichloride when sprayed upon the eggs and young larvae, but neither of these materials was very toxic to the nearly mature larvae. The cost of treatment for three applications of mercury bichloride for the season is over £13 per acre, and for five applications of the Bordeaux oil emulsion is about £9 per acre.

Graf (J. E.). U.S. Bur. Ent. **Climate in Relation to Mexican Bean Beetle Distribution.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 116–121, 3 figs. Geneva, N.Y., February 1925.

The author's abstract of this paper is as follows :—

The Mexican bean beetle, *Epilachna corrupta*, Muls., is recognised as a pest of beans in three separate areas in the Northern Hemisphere [viz., Mexico, and the Eastern and Western United States]. These three areas differ widely as regards temperature and moisture, one being typically arid, one humid, and the third an intermediate form with dry winters and heavy precipitation during the summer. The persistence of the insect under these varying conditions leads to the conclusion that temperature and humidity are not important factors in limiting the distribution of the Mexican bean beetle.

Marcovitch (S.). **Non-Arsenicals for Chewing Insects.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 122–128. Geneva, N.Y., February 1925.

The bulk of the information in this paper has already been noticed [*R.A.E.*, A, xiii, 118]. Samples of powdered cryolite ($Al_2F_6 \cdot 6NaF$) were dusted on bean plants under cages. It was found to be very efficient, killing bean beetles [*Epilachna corrupta*] in from 10 to 20 hours. It probably breaks up when ingested by the insects, and forms toxic products. Fluorspar, on the other hand, is much more stable and therefore less toxic. Mixed with 5 parts of hydrated lime, cryolite killed the beetles, but also injured the bean plant, as this substance reacts with hydrated lime, even when used as a dust. When cryolite was mixed with two parts of lime, the beetles were dead after 2 days, and the plant was not injured. A spray containing 2 lb. of cryolite and 4 lb. of lime to 50 U.S. gallons of water was also found effective.

Huckett (H. C.). **The Control of Aphids, which infest Cauliflower Seed Beds on Long Island, by Means of Tobacco Dust Mixtures.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 128–132. Geneva, N.Y., February 1925.

The cauliflower growing industry on Long Island has of late years been seriously endangered by injury to plants in the seed-bed caused by the Aphids, *Myzus persicae*, Sulz., and *Macrosiphum solanifolii*, Ashm., which migrate from the vast areas of potatoes. *M. persicae*, which is the more injurious, overwinters on Long Island in the egg and nymphal stages on cruciferous crops that are capable of surviving the winter. In the spring and early summer most of the winged forms migrate to potato areas, where they breed until the potato-blossom appears. With the disappearance of the blossoms, a general exodus takes place to any other form of vegetation. If cauliflower seedlings are less than half grown, they will be seriously stunted if not killed. Plants more than half grown are retarded and stunted. Wet weather will almost entirely eliminate the injurious effects of these Aphids.

A satisfactory method of treating the seed-bed, if the application is carefully timed, is a spray mixture of 1 pint nicotine sulphate to 100 gals. water. If the Aphids are particularly abundant, this should be applied at intervals of 3 or 4 days for a period of two weeks. This spray is low in cost but temporary in effect. Two per cent. nicotine sulphate dusts have been used to control Aphids in the seed-bed but must be applied under favourable weather conditions and in large

quantities. In 1923 comparative tests were made with pure tobacco dust of superfine quality and containing 1 per cent. nicotine, together with a 2 per cent. nicotine sulphate-hydrated lime dust mixture, and a nicotine sulphate spray composed of 1 pint 40 per cent. nicotine sulphate and 100 gals. water. The results show that rows of seedlings treated with pure tobacco dust yielded about 25 per cent. more first-class plants than those treated with nicotine sulphate dusts and sprays. In the winter of 1923–24 experiments were carried on under greenhouse conditions with superfine tobacco dust diluted with hydrated lime in the proportions of 90 : 10, 85 : 15, 75 : 25, 50 : 50, by weight respectively, with a view to cheapening the dust mixture without losing its insecticidal properties. The mixture which gave the highest average killing effect in seven series of experiments was tobacco dust 85 lb., hydrated lime 15 lb. Excessive moisture almost entirely destroyed the killing efficiency of tobacco dust mixtures. Further tests in the seed-bed with superfine tobacco dust-hydrated lime mixtures 85 : 15, and 50 : 50, and pure tobacco dust itself showed a slight advantage in favour of the first named. The advantages of tobacco dust-hydrated lime mixtures are: Simplicity of application and limited number of applications necessary, namely, two or three, according to the weather. The disadvantage is the necessity for heavy applications, entailing a higher cost of material than for nicotine sulphate sprays or dusts.

Campbell (R. E.). U.S. Bur. Ent. **The Problem of Celery Leaf-tyer Control.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 133–136. Geneva, N.Y., February 1925.

The celery leaf-tyer, *Phlyctaenia rubigalis*, Hb., was first recorded as a pest in California in 1909. It is most numerous and active in warm weather, when the main celery crop is young and growing vigorously. Two or three generations may occur during the summer. The generations in the field overlap, and during September and early October the fields are continuously infested by moths that have developed in the beet fields or the early celery and seed beds. Early celery should not be grown near a beet field on account of the danger of an infestation after the celery is well grown. Spraying with lead arsenate 3 lb. to 100 U.S. gals. water, when properly applied, will give satisfactory control. Several applications may be necessary at intervals of two weeks or more, as re-infestations may take place from the overlapping generations. Spraying should cease at least a month prior to harvesting, and in no case should more than 3 lb. of the arsenical to an acre be used for each application.

Weigel (C. A.). U.S. Bur. Ent. **Further Data on the Use of Calcium Cyanide as a Greenhouse Fumigant.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 137–141. Geneva, N.Y., February 1925.

Experiments were conducted during 1924 for the purpose of determining how soon after exposing calcium cyanide to the atmosphere of a fumigation box the gas evolved would reach a satisfactory killing concentration, and whether an overnight exposure at a concentration as low as $\frac{1}{4}$ ounce of calcium cyanide per 1,000 cubic feet of air space would be effective. Three series of tests were made in a box of 200 cubic feet capacity, using calcium cyanide dust in one series,

granular calcium cyanide in a second, and sodium cyanide, as a control, in the third, with exposures lasting from 1 to 7 hours inclusive, and a period of 15 hours, all night ; on four species of Aphids, *Myzaphis* sp. on rose, *Aphis rumicis*, L., on nasturtium, and *Macrosiphum* (*Macrosiphoniella*) *sanborni*, Gill., and *Rhopalosiphum rufomaculata*, Wils., on chrysanthemum. The doses were at the rate of $\frac{1}{2}$ oz. of calcium cyanide or $\frac{1}{4}$ oz. of sodium cyanide (the approximate equivalent) per 1,000 cubic feet. The results are given in a table, overnight fumigation showing a mortality of 100 per cent. in each test. On rose, scorching began about the sixth hour, and on chrysanthemum occurred more or less throughout the series.

Twenty-five large commercial greenhouses were then fumigated for 12–15 hours with a dosage of $\frac{1}{4}$ oz. granular calcium cyanide per 1,000 cu. ft., the plants in them being infested with Aphids, chiefly *Myzaphis* sp. The control was excellent and the scorching on roses negligible. Other tests gave similar results with *Myzus persicae*, Sulz., on carnations, *Illinoia pisi*, Kalt., on sweet peas, and *Macrosiphum sanborni* on chrysanthemums. Large orchid houses were fumigated with a 1 oz. dosage, resulting in a 100 per cent. mortality of the scale, *Diaspis boisduvali*, Sign., and 52 per cent. of the chaff scale, *Parlatoria proteus*, Curtis, without injury to the plants. Satisfactory results were also obtained with the greenhouse whitefly, *Trialeurodes vaporariorum*, Westw., on various plants, at the $\frac{1}{4}$ oz. dosage. With calcium cyanide the gas is given off rather more slowly, and a longer exposure may be required than with sodium cyanide. Calcium cyanide is, however, easier to use, and for that reason may be more generally adopted by florists.

BROADBENT (B. M.). U.S. Bur. Ent. **Notes on the Life-history of the lesser Bulb Fly,** *Eumerus strigatus*, **Fallen.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 141–143. Geneva, N.Y., February 1925.

Studies of the Syrphid, *Eumerus strigatus*, Fall., were carried on from August to December in cages containing pans of narcissus bulbs and onions. Maximum emergence occurred at night. The pupal period varied from 8 to 16 days. In some cases mating took place the day after emergence ; it occurred in sunlight, and could be induced by artificial light on cloudy days. The flies were fed on honey and lived about three weeks. Eggs were deposited usually in masses between the outer layers of dry, brown skin of sound narcissus bulbs and onions. Larvae in feeding rasp the bulb tissue with their mouth hooks, later feeding in decaying or fermenting areas. The eggs hatched in a few days, but the duration of the larval period was very variable, some individuals pupating about a month after hatching, while others did not pupate for more than three months. A few eggs were laid by flies that emerged during October. These hatched early in November and in December appeared nearly as large as the larvae of the previous generation. The larvae are frequently associated with decaying or fermenting bulbs, and it appears that the young larvae feed almost continuously, except just before pupating. It is possible therefore that in infestations under field conditions the bulbs may have been damaged by larval feeding and that the decay is a secondary infection. The evidence is not conclusive, but until it can be demonstrated that the larvae do not damage sound bulbs, this fly must be regarded as a potential pest of *Narcissus* and onions.

Doucette (C. F.). U.S. Bur. Ent. **The Cattleya Fly** (*Isosoma*) *Eurytoma orchidearum* **Westwood.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 143–147. Geneva, N.Y., February 1925.

The phytophagous Chalcid, *Eurytoma orchidearum*, Westw., was introduced into the U.S.A. many years ago with orchids of the genus *Cattleya* from the tropical regions of Central and South America. The most important form of injury is the tunnelling by the larvae in the younger growths of the plants, which prevents flowering. Details are given of the life-history [*R.A.E.*, A, vi, 326]. The larval stage requires about 70 to 100 days for development. The pupa changes colour in 15 to 20 days, and the adult emerges 6 to 18 days after the colour-change. The total period from egg deposition to emergence of adults varies from 100 to 158 days. Mating was observed five minutes after the adults left the plant, and oviposition took place in various instances in from thirty minutes to two hours. The average length of life of the adults is from 7 to 15 days, the maximum observed for a female being 23 days and for a male 18. Both sexes appear to be diurnal in their habits and show little activity at a temperature of less than 60°F. No adults have been observed to feed. Remedial measures suggested are removal of all infested growths and semi-weekly dusting for five months with the following nicotine-impregnated dust :—Kaolin 50 parts ; hydrated lime 20 parts ; tobacco dust (containing 1 per cent. nicotine) 25 parts ; 40 per cent. nicotine sulphate 5 parts.

Smith (H. S.). **The Commercial Development of Biological Control in California.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 147–152. Geneva, N.Y., February 1925.

Most attempts in the biological control of insect pests have previously consisted of the simple introduction and establishment of entomophagous insects rather than in their continuous laboratory propagation and distribution in order to force them to a condition of permanent dominance. The latter type of work has been extensively developed against the mealybugs [*Pseudococcus*] attacking *Citrus* in California, and it has become practically the only method in use at the present time. Insectaries have been established in various places in California and are supported by various methods. Each insectary is operated under a man with several years' experience in the propagation of beneficial insects, and an organisation has been formed amongst them, which meets at stated intervals for discussion of mutual problems.

Reliance is placed largely in the use of a single predatory insect, the Coccinellid, *Cryptolaemus montrouzieri*. Following two years of a most serious outbreak of mealybug, the pest was brought into complete subjection by the propagation and distribution of *C. montrouzieri* from local insectaries in the infested districts. Details of costs of operating show them to be much lower than those of spraying, and they will be greatly reduced during the coming year, as a result of improvements in propagation methods. Even in areas where *C. montrouzieri*, left alone, has not been able to maintain itself, it can be made to dominate its host by continued colonisation. The insectaries have, in addition to *C. montrouzieri*, handled many other beneficial insects, including *Tanaomastix* (*Leptomastidea*) *abnormis*, *Aphycus lounsburyi*, *Chilocorus bivulnerus*, *Orcus chalybeus*, *Rhizobius* sp. and *Scymnus binaevatus*.

FELT (E. P.). **The Dissemination of Insects by Air Currents.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 152–156. Geneva, N.Y., February 1925.

This is a brief summary of some of the more significant data recently acquired respecting the dissemination of insects by air currents, which suggest that such insects as the cotton moth, *Alabama argillacea*, the corn ear worm, *Heliothis* (*Chloridea*) *obsoleta*, and a number of other southern moths, really drift on the somewhat prevailing southerly or south-westerly winds, especially as convectional air currents over heated areas would very likely carry them 1,000 feet or more above the earth. Mosquitos have been observed 3,000 feet above the surface. The monarch butterfly, *Anosia plexippus*, has spread widely in the Pacific Ocean within the last half of the preceding century, presumably taking advantage of favourable winds both in these wanderings and in its seasonal migrations. Lengthy flights of butterflies in Europe can probably be explained in the same way. The drifting and distribution of ballooning spiders is obviously due to winds and closely parallels what has been observed among insects.

DOANE (R. W.). **Scientific Names of Economic Insects.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 158–162. Geneva, N.Y., February 1925.

This paper records a discussion on the confusion resulting from the repeated changes in the names of insects, and it was suggested that a committee should be appointed to provide a list of scientific names, which would be presented to the Association of Economic Entomologists for approval. The Committee would naturally seek the co-operation of the British Committee on Entomological Nomenclature, and of any other committees that might be appointed by any organisation interested in stabilising entomological names. Where there were differences of opinion, especially among different national committees, in regard to the proper names to use for certain insects, such questions would be referred to the International Committee on Zoological Nomenclature, whose decision would be final.

SANDERS (J. G.). **Entomologists entering Commercial Fields.**—*Jl. Econ. Ent.*, xviii, no. 1, p. 163. Geneva, N.Y., February 1925.

Only an abstract of this paper is given in which it is urged that distinctions between entomologists engaged in scientific research and those connected in commercial concerns should not be insisted on. Commercial companies now realise the advantage of having a trained entomologist in their service, and they should be willing to have an unbiased and accurate report on the merits or demerits of their products.

CROSSMAN (S. S.). U.S. Bur. Ent. **Foreign Travel and Entomologists met while searching for Enemies of the Gipsy Moth.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 164–172. Geneva, N.Y., February 1925.

This paper contains an account of the foreign entomologists visited and the area covered in Europe and Northern Africa while investigating infestations of the gipsy moth, *Porthetria dispar*, L., and the brown-tail moth, *Nygmia phacorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), with a view to obtaining insect parasites and predators for introduction into

the United States. At the Madrid laboratory, where control experiments are carried on every year on the most serious forest and shade tree pests, the chief operations are directed against *P. dispar*, *Cnethocampa* (*Thaumetopoea*) *pityocampa*, Schiff., *Dendrolimus pini*, L., and *Lymantria monacha*, L. Modern methods, such as tree banding and creosoting of gipsy moth eggs, are practised. A number of species of parasites have also been transferred to areas where they were absent, and a gipsy moth egg parasite, *Schedius kuvanae*, How., has been imported from the United States. A small shipment of this parasite was also sent to Rabat, Morocco, as no other control methods are being practised in the large cork oak forests in that district, where there is a heavy infestation of *P. dispar*. In a forest in Sicily a light gipsy moth infestation was found and an abundance of cocoons of *Apanteles melanoscelus*, Ratz., one of the gipsy moth larval parasites that have been successfully established in New England. A very thorough search was made in Hungary, and a few moderate or heavy infestations were located. In Rumania it was not practicable to inaugurate parasite-rearing work on account of the very light infestation of the last two years. Parasite rearing was started in an infested locality in the centre of Bulgaria. In spite of a very light infestation in the locality visited in Jugo-Slavia over a thousand Tachinids were obtained and sent to the United States. Altogether, over 100,000 puparia of Tachinid parasites of the gipsy moth have been sent from the various laboratories, over half of which were *Parasetigena segregata*, Rond. Next in order according to the numbers sent are : *Blepharipa scutellata*, R.-D., *Tachina larvarum*, L., *Sturmia gilva*, Hartig, *Lydella nigripes*, Fall., *Carcelia gnava*, Meig., *Zenillia libatrix*, Panz., *Tricholyga grandis*, Zett., and *Compsilura concinnata*, Meig. Other parasites and predators have been sent in small numbers, including *Apanteles fulvipes*, Hal., *A. vitripennis*, Hal., *A. melanoscelus*, Ratz., *Chalcis intermedia*, Nees, *Hyposoter* sp., *Hadrocarabus latus*, Dej., var. *gougeleti*, Reiche, and a few *Silpha quadripunctata*, L.

DE LONG (D. M.) & MATHEWSON (A. A.). **The Influence of Temperature and Humidity upon the Development of** *Myzus houghtonensis*, **Troop.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 172–176, 1 fig. Geneva, N.Y., February 1925.

A previous paper by the authors dealt with the life-history of *Myzus houghtonensis*, Troop [*R.A.E.*, A, xii, 315], but an account of the number of seasonal generations and the necessary time for their development has not been previously published. During the season of 1924, 16 generations were recorded to the middle of November. The individuals of the last generation lived 40 days without reproducing, and though the latter part of the cycle was thus incomplete as a record of generations in direct line, other material showed three additional generations. The longest time required for development and reproduction except for the last generation, which was abnormal, was 28 days, the shortest time for other generations being 6 days, and the average 12½. Temperature and humidity seem to have a definite effect upon the length of specific generations in the life-cycle of *M. houghtonensis*. A low temperature, especially below 50° F., seems to be a retarding factor, a high humidity combined with a low temperature being apparently the most important combination of factors retarding development. The best condition for rapid development seems to

be a high temperature with a corresponding low humidity. A chart is given showing the temperature and humidity records for seven months with relative lengths of specific generations.

KELLY (E. G.). **An Example of Extension Methods and Results in Kansas Entomology.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 177–181. Geneva, N.Y., February 1925.

This paper gives a summary of the wheat situation in Kansas since 1916, with special reference to the control of Hessian fly, *Mayetiola* (*Phytophaga*) *destructor*, Say. The 1916 outbreak was the last of any consequence until that of the year 1924, when the damage caused reached approximately 20,000,000 bushels. The Kansas Experiment Station in co-operation with the United States Bureau of Entomology developed a method for the control of this pest during the years from 1907 to 1917, which was practised effectively on 20,600 Kansas farms in 33 counties during 1924. The methods consisted in : Stacking wheat so as to plough the ground in July and finish ploughing by 15th August ; cultivating the fields with harrow and disc to destroy the self-sown wheat and prepare a good seed-bed ; selection of the best seed ; and sowing wheat at the right time, not too early nor too late. In 1916 excellent results were obtained from these methods, whereas certain counties in which they were not adopted were losing millions of bushels. The farmers in the counties have followed these practices since then and now have the Hessian fly under control. Data are appended giving the acreage sown with wheat and the yield per acre. These demonstrate that had the farmers in the State as a whole practised the methods recommended, not only would there not have been a loss of 20,000,000 bushels for 1924, but an actual increase in some counties would have been shown.

PETERSON (A.). **A Bait which attracts the Oriental Peach Moth (*Laspeyresia molesta*, Busck).**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 181–189, 2 figs. Geneva, N.Y., February 1925.

During the daily collection of the Oriental peach moth, *Cydia* (*Laspeyresia*) *molesta*, Busck, from bait pans in the peach orchard of the New Jersey Agricultural Experiment Stations, it was not possible to make a careful study of the attractive baits during May and most of June, and therefore it is not yet known whether the adults of the spring broods will come to a molasses-yeast bait as readily as those of the following broods. Various odour-producing chemicals, placed, as a rule, in sweetened media (corn syrup or molasses, etc.), did not prove attractive. When yeast was employed, the following formula was most frequently followed : 1 qt. molasses, etc., 3 qts. water and 1 cake of yeast. Both sexes of *C. molesta* are attracted to a molasses-yeast bait when it is placed in small enamelled pans and suspended on branches of peach trees old enough to bear fruit. Pans shaded from the late afternoon sun usually caught more moths than those exposed to bright sunlight. The bait was most attractive one to four days after it is placed in the orchard, apparently owing to gases arising during fermentation, and continued to be so for 50 days or longer. The bait pans were kept half full by adding water when necessary. Molasses was added every two weeks, sufficient yeast being present in the old bait to renew active fermentation. The majority of moths come to the bait pans at sunset or during twilight. Some may come

early in the morning. Moths were observed to be inactive at temperature below 55° F., and also during heavy rains. Records are given of the number of moths and the ratio of the sexes captured each day from 20 molasses-yeast bait pans from 20th June to 1st November 1924. The second brood extends over the longest period of time and contains the greatest number of adults. This agrees with the infestation in the field and with life-history data in the insectary. The average ratio of the sexes in the daily catch of moths may prove to be useful in determining the appearance of new broods in the orchard. So far as observed the males appear to predominate during the early part of the emergence period of the first and second broods, and the females towards the end of the emergence period of the first and second broods.

Guyton (T. L.) & Champlain (A. B.). **Notes on the Life-history and Behaviour of the Oriental Fruit Moth in Pennsylvania during the Season of 1924.**—*Jl. Econ. Ent.*, xviii, no. 1, p. 190. Geneva, N.Y., February 1925.

The chief characteristic in the behaviour of the Oriental fruit moth, *Cydia* (*Laspeyresia*) *molesta*, Busck, during 1924 was the flight of the moths during the middle of the day. This was observed on May 5th, 6th and 7th, being at its height between 10 a.m. and midday on 6th May. Daylight flight was noted several times subsequently throughout the season, but the moths were less numerous.

The larvae from eggs of the first generation mostly fed in the twigs of peach, though in one orchard where twig-growth was slight many of this generation entered the growing fruit. This infested fruit dropped at the same time as that infested with curculio [*Conotrachelus nenuphar*]. Eggs from the second generation were found on both peach and quince foliage, and third generation larvae were found in quince twigs. A definite migration was observed at one period of the second brood larvae when about half grown from the peach twigs to the fruits. The rate of infestation in the vicinity of Harrisburg averaged about 65 per cent. in ripe peaches. In small quince plantings the fruit was protected by tough paper bags placed on the fruit in the first week of July.

Stearns (L. A.). **Orchard Control Work of 1924 against the Oriental Peach Moth in Southern New Jersey.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 191–199, 2 figs. Geneva, N.Y., February 1925.

Experimental work against *Cydia* (*Laspeyresia*) *molesta*, Busck (Oriental peach moth) consisted in spring ploughing to the depth of about six inches, followed by thorough disking, the operations being completed before the end of the second week in May. Large cages, twelve feet square, were erected about the base of three peach trees in a cultivated and three in an uncultivated orchard section in order to secure records of the emergence of moths of the spring brood. These indicate that thorough spring cultivation destroyed 100 per cent. of the over-wintered larvae and pupae on the ground round the trees.

In spraying and dusting experiments, treatments were applied at approximately 14- and 7-day intervals. In order to ascertain the results of these tests, a careful examination was made to determine the severity of twig injury by the first and second broods of the moth and also the extent of fruit injury at thinning time on 264 trees. It is evident from

the data given that all combination nicotine treatments applied as sprays gave varying degrees of control not attained by the same treatments applied as dusts. A combination spray of nicotine, 1–800, added to fungicidal-lead arsenate (1 lb. to 50 U.S. gals.) on a 14- or 7-day schedule resulted in an increase of peaches free from this pest amounting to 13·3 per cent. The practical application of this combination spray is dependent on a variable number of factors, the most important being the severity of the infestation, the cost of the treatment, and the probable yield and value of the crop. Under average conditions there should be a return of approximately 10d. per bushel above the additional cost in spray material.

Cory (E. N.). *Laspeyresia molesta* **Busck as a Quince Pest.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 199–201. Geneva, N.Y., February 1925.

A brief account is given of the destruction of an entire crop in one quince orchard in Western Maryland by a combination of cedar rust and *Cydia* (*Laspeyresia*) *molesta*. No evidence of twig feeding was found. Quinces injured by rust were infested by the larvae, probably of the third brood. As the fruit matures very late, the larvae of the overwintering brood are able to complete their growth. Some pupate on the trees, while those in the harvested crop form their cocoons in the basket containers, etc. The loose bark and the system of pruning enable large numbers to form their hibernacula on the trunk, but in this situation parasites and predatory arthropods and birds are effective control factors. *Pediculoides ventricosus* was found in cocoons containing dead larvae. Experiments for the killing of larvae in storage with heat and paradichlorobenzene have given good results.

Bilsing (S. W.). **Life-history of Pecan Nut Case-bearer,** *Acrobasis caryivorella* **Zell.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 202–206. Geneva, N.Y., February 1925.

The pecan nut case-bearer, *Acrobasis caryaevorella*, Zell., is the most destructive insect pest of the pecan in Texas. Its abundance depends upon the extent of the crop of the previous year and the number of parasites and the climatic conditions during the months of March, April and May. There may be two or four generations a year, depending probably on the food supply. The spring brood is derived from the larvae of the third and fourth generations of the previous year, and it would appear that when there are only two generations, the overwintering larvae may be those of the first generation or the first and second generations of the previous year. The fourth generation is not completed until the following spring, when the individuals merge with the larvae of other generations to form the spring brood. The larva spends the winter in a hibernaculum, which it spins on the side of a bud. The first larvae emerge in March or April and, after feeding for a time on the buds, bore into the new growth at the juncture of the leaf stem and the main branch. They feed in this burrow until they are full grown and then spin a cocoon there and pupate late in March or early in April. The moths begin emerging about the middle of April and continue to do so till the middle or latter part of May. The adults begin to lay eggs on the second or third night after emergence, and one moth may lay from 50 to 150. The eggs hatch in four or five

days. The larvae of the second generation hollow out the nut, but the larval stage of the third generation is usually passed within the husk. The larval stage lasts from 17 to 51 days. The pupal stage varies from 5 to 24 days, the average being 9 in summer and 13 in the spring. The moths of the third brood may not oviposit for several days after emergence, and the length of the egg stage varies according to the weather. The resulting larvae feed on nuts, if available, or at the base of buds and leaf stems, after which they spin their hibernacula.

HEADLEE (T. J.). **A small Contribution to Knowledge of Arsenical Requirements for Control of Codling Moth.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 206–214, 3 figs. Geneva, N.Y., February 1925.

Field studies and experiments have been made on a large scale where infestation by *Cydia* (*Carpocapsa*) *pomonella*, L., normally affects 100 per cent. of unsprayed fruit. The results indicate that the factors underlying control of this pest by arsenical treatments are the amount of arsenic applied per tree per treatment, the constancy with which the coating is maintained during the periods of entry, and the concentration of the moth, either through the agency of prevailing winds or through other natural increase. Concentration is the most powerful of these factors, and it is believed that this can be overcome through the cumulative effect of the employment of arsenicals. With regard to the amount of arsenical per tree, it was found that for apple trees 18 to 20 ft. high and 25 to 30 ft. across, $\frac{2}{3}$ lb. lead arsenate in 10 U.S. gals. spray per treatment per tree gave excellent results. Larger amounts might be an advantage, but do not seem to be so. The importance of maintaining the coating thus given during the period of entry by larvae of the first and second generation is not generally realised, because in cases of comparatively light infestation a single heavy coating may be adequate to check the entering larvae of either the first or second generation. Under such conditions, timing is the essential for success, and much stress has been laid on this factor, but in a heavy infestation timing does not seem to solve the problem, apparently because the period of entry of any generation is too long for one treatment to remain active, except under unusual conditions of lack of rainfall.

PARROTT (P. J.) & GLASGOW (H.). **The Efficiency of various Spray and Dust Mixtures in controlling the Rosy Aphis.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 214–218. Geneva, N.Y., February 1925.

The introduction of lubricating oil emulsion and nicotine dusts as insecticides suggested these experiments, in which the Aphid-destroying properties of these preparations were compared with the standard lime-sulphur and nicotine sulphate solution (1 part to 8, 10 or 15 parts of water, to each 100 gals. of which is added from $\frac{3}{4}$ to 1 pint of 40 per cent. nicotine sulphate). The susceptibility of *Anuraphis roseus* (rosy aphis) to treatment at other periods than when the buds are opening was also studied. The results with the different materials tested prove that the lime-sulphur with nicotine sulphate is by far the most consistently effective. A "dry-mix" or "wettable sulphur" spray containing nicotine sulphate was appreciably and consistently less efficient. Lubricating oil emulsion, while giving good commercial control, was inferior to lime-sulphur or even the "dry-mix" spray,

although the difference in insecticidal efficiency is not marked; the usefulness of these oils lies in their cheapness, especially if the treatment is aimed simultaneously at Aphids and San José scale [*Aspidiotus perniciosus*]. Sulphur-lead-arsenate dust containing 2 per cent. nicotine proved efficient when applied at the proper time, but the period for effective treatment seems to be much shorter than in the case of the other preparations, besides necessitating other favourable conditions, such as dry, warm weather and absence of wind. For all spray combinations tested, the delayed dormant period, that is, when the tips of the leaves of the more advanced blossom buds are projecting as much as $\frac{1}{4}$ or $\frac{1}{2}$ in., is undoubtedly the proper time to apply remedies for *A. roseus*. The indications also are that the time for effective spraying may be prolonged somewhat over a period approaching the pink stage, provided that the young infested leaves have not become too tightly curled. In the calyx stage, even the most effective sprays containing nicotine, thoroughly applied, have practically no effect. Where dust mixtures containing high percentages of nicotine sulphate were used, the delayed-dormant applications have never given successful results, but if treatment is delayed until the pink of the blossoms just begins to show, a great reduction in the injury by *A. roseus* is obtained.

Cole (F. R.). U.S. Bur. Ent. **The natural Enemies of the Citrus Aphid,** *Aphis spiraecola* **(Patch).**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 219–223. Geneva, N.Y., February 1925.

There was an unusual outbreak of Aphids on orange trees in the winter of 1923 in Florida [*R.A.E.*, A, xii, 446, 586, etc.]. The species concerned, *Aphis pomi*, DeG. (*spiraecola*, Patch) [*R.A.E.*, A, xii, 417], is found in all parts of the United States on plants of the genus *Spiraea*. There are few true parasites of this Aphid, and almost all control by insect enemies during 1924 was accomplished by predators, Coccinellid beetles being probably of most importance, closely followed by Syrphids, and lace-wing flies being a minor factor in control.

The larvae of the green lace-wing flies, *Chrysopa* spp., are abundant on *Citrus* in Florida. About two hours after they hatch, they become very active and are soon covered with Aphid skins and their own cast skins. The instars are short, the first two lasting about three days each and the pupal period about ten days. The Coccinellid most frequently found to be predacious on *A. pomi* on *Citrus* is a melanic form of *Olla oculata*, Say, known as *sobrina*, Casey, and is easily confused with *Chilocorus bivulnerus*, Muls. It is active most of the year and is of considerable economic importance, as it is not dependent on the citrus Aphids for food. *Hippodamia convergens*, Guér., is not uncommon in some parts of Florida, and *Cycloneda sanguinea*, L., also occurs, but has not been seen in any great numbers. There are several species of *Scymnus*, the most common near Orlando being *Scymnus cervicalis*, Muls. Two Syrphids, *Baccha clavata*, Wlk., and *B. lugens*, Lw., are predacious on the citrus Aphid. Their eggs hatch in about 48 hours, and a mature larva will devour 20 to 30 Aphids a day. *B. clavata* is parasitised by *Pachyneuron siphonophorae*, Ashm. An undetermined Hymenopterous parasite was reared from the puparia of *B. lugens*.

An Agromyzid fly, *Leucopis americana*, Malloch [*R.A.E.*, A, x, 206] was also found preying on the citrus Aphid. Of these various enemies of *A. pomi*, only *Scymnus cervicalis* and *Leucopis americana* are

commonly found in colonies on *Spiraea*, its native food-plant, probably because the stems and leaves of *Spiraea* are small and do not allow much room for a large predator, and as the leaves do not curl as on orange, the predators are exposed to sun, weather, and casual enemies.

PAYNE (N. M.). *Pyralis farinalis*, **Linn.** (**Lepidoptera**). **An Alfalfa Hay Worm in Kansas.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 224–227, 1 fig. Geneva, N.Y., February 1925.

Pyralis farinalis, L., is usually regarded as a stored product or mill pest, but has been recorded as infesting clover hay, and was observed as an important pest of lucerne hay near Manhattan, Kansas, during the years 1917–1920. It may have one or two generations in the same year. Overwintering occurs in the larval stage. In the two-generation cycle the summer generation is short, and the later one requires a long period for hibernation and development. Stacks of baled hay and loose hay are equally attacked, the hay being either consumed or made unfit for use by webbing and excrement. The chief natural control is a Chalcid parasite of the genus *Tetrastichus*. In the summer of 1920 parasitism by this species amounted to 80 per cent. The numbers of *P. farinalis* were greatly reduced, but the larvae of another Pyralid, *Setomorpha insectella*, F., became common in the hay stacks in 1920–1921.

PIERSTORFF (A. L.). **Control of Aphids on Nursery Stock.**— *Jl. Econ. Ent.*, xviii, no. 1, pp. 227–230. Geneva, N.Y., February 1925.

During 1923 and 1924 a study was made of the Aphids present on one-year-old apple buds, on apple seedlings and on *Spiraea vanhouttei*. The species on apple were known to be *A. pomi*, DeG., and *A. sorbi*, Kalt., and examination of the species on *Spiraea* [*A. spiraecola*, Patch] proved it to be *A. pomi*, thus confirming Patch's view of their identity [*R.A.E.*, A, xii, 417]. Cross transfers of the species on apple and on *Spiraea* were made three times during the season, all the colonies thriving and producing winged forms. A lime-nicotine dust mixture (2·7 per cent. nicotine) was found to be the best remedy for the Aphids, two or three applications sometimes proving necessary for the control of *A. pomi*. All the applications were made with hand blowers, which seemed to be the most effective for the conditions encountered. One application of the dust proved sufficient to check the numbers of *Myzus cerasi* on sweet cherry stock. The lime-nicotine dust has proved so successful that many growers are discarding the use of fish-oil soap solution in its favour.

STEAR (J. R.). **Mirid predaceous on European Red Mite.**— *Jl. Econ. Ent.*, xviii, no. 1, p. 233. Geneva, N.Y., February 1925.

The Capsid, *Hyaliodes vitripennis*, Say, is recorded as feeding on *Paratetranychus pilosus*, C. & F., on apple foliage.

FLINT (W. P.). **Army Worm Egg Parasite.**— *Jl. Econ. Ent.*, xviii, no. 1, p. 234. Geneva, N.Y., February 1925.

The army worm egg-parasite, *Telenomus* sp., is widely distributed in Illinois, in some cases as many as 40 to 60 per cent. of the eggs being parasitised. It is apparently one of the chief limiting factors in controlling the outbreaks of army worm [*Cirphis unipuncta*].

WHITCOMB (W. D.). U.S. Bur. Ent. **A new Formula for making Lubricating Oil Emulsions.**—*Jl. Econ. Ent.*, xviii, no. 1, pp. 234–235. Geneva, N.Y., February 1925.

The formula recommended is 1 lb. potash fish-oil soap (about 65 per cent. water), 4 (liquid) oz. amyl alcohol (fusel-oil), 1 U.S. gal. lubricating oil (spec. gr. 0·88 to 0·90) and ½ U.S. gal. water. It is important that the amyl alcohol be well stirred into the soap; the lubricating oil is then added slowly with vigorous stirring until the mixture appears as an oily salve. The water is then stirred in to form a creamy emulsion. This formula in dilute form retains its stability when mixed with Bordeaux mixture or nicotine sulphate. The cost of the diluted emulsion containing 2 per cent. of oil is approximately a halfpenny a U.S. gallon. Cold stirred emulsions of this kind have given good results against various Coccids. Comparative tests of the effectiveness of lubricating oil emulsions made by the standard and this formula show an advantage in the favour of the latter indicating some insecticidal value of the amyl alcohol. No injury to plants has been noticed.

GROSSMAN (E. F.). **A preliminary Report on how the Cotton Boll Weevil takes up Poison.**—*Jl. Econ. Ent.*, xviii, no. 1, p. 236. Geneva, N.Y., February 1925.

The cotton boll weevil [*Anthonomus grandis*, Boh.] receives the poison accidentally on the tip of the proboscis, and later, when chewing or moving its mandibles, the poison is introduced into the intestine. Sprays are less efficient than dusts because as the spray dries it forms a varnish-like film of poison, which does not adhere to the proboscis of the weevil crawling over the poisoned area, whereas loose particles of dust do so readily.

DUTTON (W. C.), PETTIT (R. H.), BENNETT (C. W.) & CARDINELL (H. A.). **Spraying Calendar.**—*Michigan Agric. Expt. Sta.*, Special Bull. 140, 29 pp. East Lansing, Mich., January 1925.

Instructions are given for the spraying of various fruit crops in Michigan under average conditions; the preparation of the sprays recommended is also described.

GREENE (C. T.). U.S. Bur. Ent. **The Puparia and Larvae of Sarcophagid Flies.**—*Proc. U.S. Nat. Mus.*, lxvi, art. 29, no. 2566, pp. 1–26, 9 pls. Washington, D.C., 1925.

Among the Sarcophagids dealt with are the following parasitic species: *Agria affinis*, Fall., reared from larva of *Vanessa antiopa*; *Sarcophaga cleodis*, Aldr., from *Eleodes extricata*, *E. fusiformis*, *E. hispilabris*, *E. obsoleta*, *E. tricostata* and *Asida obovata*; *S. opifera*, Coq., from *Melanoplus devastator*, *M. marginatus*, *M. differentialis*, *M. plumbeus* and *M. bivittatus*; *S. hunteri*, Hough, from *M. differentialis*, *M. atlantis*, and codling moth [*Cydia pomonella*]; *S. atlantis*, Aldr., from grasshoppers; *S. sternodontus*, Towns., from pupae of *Erinnyis ello*; *S. aculeata*, Aldr., from grasshoppers; and *Helicobia helicis*, Towns., from *Allorrhina nitida*.

Buys (J. L.). **The Cicadellidae of the Vicinity of Ithaca, New York, with special reference to the Structure of the Gonapophyses.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 80, 115 pp., 15 pls. Ithaca, N.Y., December 1924. [Received 2nd April 1925.]

The character of this study of the Jassid fauna of Ithaca is indicated by its title.

Dietz (H. F.). **Notes on the Termites of Indiana.**—*Proc. Indiana Acad. Sci.*, 1920, pp. 87–96, 2 pls., 2 figs. [*Sine loco*], 1921. [Received 6th April 1925.]

Reticulitermes flavipes, Kollar, has hitherto been the only termite recorded from Indiana, but the author has now found *R. virginicus*, Banks, to occur in the State and suggests that *R. hageni*, Banks, is also present. The annual swarming of the winged colonising adults of *R. flavipes* occurs as early as 29th February indoors and out of doors from 21st April to 3rd June. The swarming of *R. virginicus* occurs a month later out of doors. As a result of the removal of much of the natural food of termites, such as logs and stumps, they are becoming adapted to altered conditions, so that their attacks on buildings and their contents, as well as on living plants, are increasing.

Dietz (H. F.). **Notes on the Termites of Indiana.—ii.**—*Proc. Indiana Acad. Sci.*, xxxiii (1923), pp. 299–301. [*Sine loco*], 1924. [Received 6th April 1925.]

New records of injury by *Reticulitermes flavipes*, Kollar, are discussed. In 1922 serious damage was done by *R. virginicus*, Banks. The hollow concrete blocks as now generally used for foundations lays the wood used in construction open to termite attack as though it were in direct contact with the ground, as the insects build their runaways from the ground up to the wooden plate on the hollow inside the blocks.

R. tibialis, Banks, is recorded for the first time from Indiana, and the conditions under which it was found indicate that if it is widely distributed it will also be a species of considerable economic importance. It was found tunnelling in strawberry plants.

Gladney (H.). **Bagworm Injury probable.**—*Qtrly. Bull. State Plant Bd. Mississippi*, iv, no. 4, pp. 11–12, 1 fig. A. & M. College, Miss., January 1925.

Considerable damage was done in many parts of Mississippi in 1924 by *Thyridopteryx ephemeraeformis*, which defoliated and ultimately killed valuable trees. This bagworm overwinters in the egg stage within the old female bags, which cling to the twigs of trees. The larvae hatch in the late spring and immediately begin to feed and to construct bags for themselves. They feed on deciduous and evergreen trees and shrubs, apparently preferring arbor-vitae [*Thuja occidentalis*] to other plants. The bags can be profitably gathered from deciduous and badly defoliated evergreens by hand during winter and should be burned. Spraying is more effective on evergreens not completely defoliated. Satisfactory results have been obtained with 1 lb. powdered lead arsenate to 50 U.S. gals. water to which 1 lb. resin fish-oil soap is added. A double strength solution is sometimes advised. The spray

should be applied in late spring as soon as the eggs hatch or a few days afterwards. A second application should be made in a few days if the first does not give satisfactory results.

GODFREY (G. H.). **The Depth Distribution of the Root-knot Nematode, *Heterodera radicicola*, in Florida Soils.**—*Jl. Agric. Res.*, xxix, no. 2, pp. 93–98, 5 figs. Washington, D.C., 15th July 1924.

The chief factor in any measure for the control of *Heterodera radicicola* is the depth at which the Nematodes occur. The experiments here recorded give a rough description of the relative Nematode content of certain soils at different depths and at different seasons. Soil samples were taken in successive layers in a V-shaped trench dug to a depth of 34 inches, a sterilised trowel being used to avoid contaminating any specimen with soil from another level. The soil was then placed in six-inch pots and planted with tomato seedlings in a greenhouse. In about six weeks' time the plants were removed, the roots washed, and number of root-knots per pot observed. It was found that root-knot Nematodes are often very numerous at a depth greater than that ordinarily reached by a plough, and considerable variation from one spot to another and from one month to another occurs in the depths of maximum infestation. This is probably dependent on such factors as differences in depth penetration of infested roots, the relationship of time of taking soil samples to a period of heavy rainfall, the height of the water table, and the type of the soil and the sub-soil. The influence of such factors may be sufficiently great as to overshadow any seeming seasonal change. In winter there appears to be a considerable reduction in the total Nematode content of the soil, and it is possible that regular seasonal movement does not occur to any extent unless the temperature approaches freezing in the upper layers of soil.

HEADLEE (T. J.). **Report of the Department of Entomology.**—*Rept. New Jersey Agric. Expt. Sta., 1922-23*, pp. 265–299, 1 pl., 1 fig. New Brunswick, N.J., 1924. [Received 6th April 1925.]

Further experiments with various dusts as a means of protecting beans from the attack of *Bruchus obtectus*, Say [*R.A.E.*, A, xii, 315, 326] have led to the conclusion that the efficiency of these dusts in preventing penetration of bean seed by the larvae is correlated with the size of the particles composing them and the ease with which one particle moves upon another.

The results of two years' investigations for the control of codling moth [*Cydia pomonella*, L.] show that in the case of heavy and intensive infestations it is essential that the coating of the fruit and foliage be maintained during the periods when the larvae of the first and second broods are hatching and trying to enter the fruit. Provided that an adequate spreader and adhesive is incorporated into the spray mixture, no accessory spraying is required to maintain this coating. The inferiority of dusts as compared with sprays for the control of apple insects such as *C. pomonella* and curculio [*Conotrachelus nenuphar*, Hbst.] is apparently due to the inability of the dusts to adhere to the foliage and fruit for so long as materials applied with water. The

combination of elemental sulphur, hydrated lime and powdered lead arsenate appears, however, to be satisfactory against diseases and insects attacking peach and has become the commonly recognised method of protecting this crop. Recent experiments against *C. pomonella* indicate that the present recommendation of 3 lb. lead arsenate to 100 U.S. gals. of spray mixture cannot be safely reduced. Trees from 12 to 18 feet in height require between 8 and 9 U.S. gals. of spray material to establish the film necessary for the control of *C. pomonella* under conditions of extreme abundance. A thorough investigation of the number of gallons necessary to establish a film coating on fruit and foliage is greatly needed.

The relation of time of application to the seasonal development of the apple tree is discussed. The first application depends entirely on the development of the tree, whereas the second is determined by the development of the insect itself. Consequently, no practical recommendations can be made for the second spray to be applied a definite number of weeks after the petals have fallen. The third spray is also dependent on the development of the insect. During 1920–22 the cage method was used for determining the time of application of these sprays. This consists of collecting the larvae in the spring and placing each in a small glass phial, which is closed by two pieces of cotton cloth and held by a rubber band. The bottles are stored in a box with a rainproof cover and screen wire bottom. The box is painted white to prevent heating by the sun and suspended in the orchard in the middle of an apple tree. When 50 per cent. of the adults have emerged, spraying should at once be begun. Within two weeks after the maximum emergence of the first brood, burlap bands are placed on 5 to 10 trees well distributed throughout the orchard. The first 100 healthy larvae thus found are placed in phials as above. When about 30 per cent. of the adults have emerged the third spray should be applied. This work is done by the county agents, who notify the growers when the spray should be applied.

The reduction of the infestation by pear psylla [*Psylla pyricola*, Forst.] as a result of dormant and pre-blossom treatment is very marked. The information concerning nicotine dusts and carriers has largely been noticed [*R.A.E.*, A, xii, 31]. Experiments made with calcium caseinate (kayso), high gluten wheat flour and powdered sweet skimmed milk as adhesives for lead hydrogen arsenate indicate that any of these substances retain more than twice as much of the poison on the foliage. Flour mixed with the dry lead arsenate so as to produce a 3 per cent. gluten mixture was successfully used throughout the season in gipsy moth spraying machines. In general the water soluble arsenic is reduced by the addition of these substances.

Experiments with seed impregnated with arsenic and used as poison baits just before planting of crops in the spring were not successful against wireworms. Although impregnated maize seed contained as much as 11·16 per cent. arsenic and was eaten by the wireworms it apparently had no injurious effect on them. In tests with a long series of various substances the only seeds not eaten were those treated with mercury bichloride or carbolic acid, and in the latter case the wireworms were apparently killed by the gases given off by the carbolic acid.

Brief summaries are given by A. Peterson of work on peach tree borer [*Aegeria exitiosa*, Say], *Trioza tripunctata*, Fitch (blackberry Psyllid), and *Spilographa electa*, Say (pepper maggot), published at greater length elsewhere [*R.A.E.*, A, xii, 46, 47, 363].

Beckwith (C. S.). **Report of the Cranberry Substation.**—*Rept. New Jersey Agric. Expt. Sta., 1922-23*, pp. 299–307. New Brunswick, N.J., 1924. [Received 6th April 1925.]

During 1922 spraying experiments were planned on cranberry plots just recovering from the cranberry girdler [*Crambus hortuellus*, Hb.], but which tend to rot without treatment. Each plot was sprayed with 250 U.S. gals. of Bordeaux soap mixture once just before and once just after bloom, and again 2 weeks later, but it was found that more than 3 sprays are required; next year 5 are to be tried. Further flooding experiments support the theory that the larvae will be driven from their galleries and come to the surface on a bog flooded for 24 hours early in August. Those submerged in a cheesecloth bag for 24 hours were all dead at the end of that time.

Hutson (R.). **Bee Investigations.**—*Rept. New Jersey Agric. Expt. Sta., 1922-23*, pp. 313–323, 2 figs. New Brunswick, N.J., 1924. [Received 6th April 1925.]

A detailed account is given of the relation of honey bees to fruit growing, showing their value as a factor in pollination.

Wallace (F. N.) & others. **Report of the Division of Entomology.**—*6th Ann. Rept. Dept. Conservation Indiana, 1924*, pp. 28–50. Indianapolis, Ind., 1925.

The most important insect pests found in the nursery inspection were *Lepidosaphes ulmi*, L. (oyster-shell scale), the brown form of which occurs on several food-plants, including Carolina and Lombardy poplar [*Populus deltoides* and *P. nigra italica*], snowberry [*Symphoricarpus*] and lilac; *Chionaspis pinifoliae*, Fitch (pine scale), one of the most serious pests of spruce, pine and fir in Indiana; *Aulacaspis rosae*, Bch. (rose scale) on blackberries, which apparently passes the winter in all stages in Indiana; *Aphis rubiphila*, Patch (raspberry aphis), which was very prevalent; *A. houghtonensis*, Troop (gooseberry gall aphis), found in widely separated areas; and *Melasoma* (*Lina*) *interrupta*, F., and *M.* (*L.*) *scripta*, F. (poplar and willow leaf-beetles), found over the entire State, in some cases completely defoliating Lombardy poplars and weeping willows. Other important insect pests are briefly discussed as regards details of local prevalence and habits.

Insect Pests.—*37th Ann. Rept. S. Carolina Expt. Sta., 1923-24*, pp. 43–48. Clemson College, S.C., December 1924. [Received 8th April 1925.]

The Mexican bean beetle [*Epilachna corrupta*, Muls.] is becoming very injurious in South Carolina; in some localities the beans were entirely destroyed. Injury was less severe to late summer and autumn crops. Of the poisons tested, encouraging results were obtained by dusting with magnesium arsenate mixed with 3 to 5 parts of hydrated lime, or calcium arsenate mixed with 9 parts of hydrated lime. In many sections of the State considerable injury to cotton was caused by the Capsid, *Psallus seriatus*, Reut. [*cf. R.A.E.*, A, xii, 586].

Berly (J. A.). **Protecting South Carolina from Plant Diseases and Crop Pests.**—*S. Carolina Agric. Expt. Sta.*, Circ. 32, 31 pp., 2 figs. Clemson College, S.C., December 1924. [Received 8th April 1925.]

An account is given of the work and purpose of the South Carolina State Crop Pest Commission in order to show the necessity of constant vigilance to protect the crops from introduced pests. The intrastate and interstate regulations are quoted, and a brief account is given of the introduced pests that have become established in the State as well as some of the more important pests introduced into the United States.

Lathrop (F. H.) & Buie (T. S.). **The Cotton Boll Weevil Situation.**—*Clemson Agric. Coll.*, Extens. Circ. 64, 4 pp. Clemson College, S.C., March 1925.

The factors influencing the numbers of the cotton boll weevil [*Anthonomus grandis*, Boh.] and the injury likely to accrue from it are discussed, as well as the situation in the past and the prospects for the coming season. Recommendations for 1925 include notes on resistant varieties, delinting of seed, the use of fertilisers, time of planting, spacing, cultivation, poisoning and dusting machines.

Nickles (C. B.). **Poisoning the Boll Weevil in the Piedmont Section of South Carolina.**—*S. Carolina Agric. Expt. Sta.*, Circ. 33, 39 pp., 8 figs. Clemson College, S.C. February 1925.

An account is given of *Anthonomus grandis*, Boh. (cotton boll weevil) as occurring in South Carolina, where, since its introduction in 1917, it has become the most serious pest of cotton. Many experiments in poisoning are described. The damage done in different seasons is very variable, amounting sometimes to 75 per cent. of the crop. The loss depends upon many factors; early maturing varieties are as a rule less subject to injury than later ones. When weevils are not particularly abundant, it is frequently difficult to decide whether poisoning is worth while. As a general rule it is considered that if the crop promises to yield as much as one-third of a bale to the acre and severe infestation is noticed before maturity of the crop, a satisfactory profit would be derived from applications of calcium arsenate dust. These applications should be begun as soon as boll weevil injury is observed on as many as 10 per cent. of the squares, and should be continued as long as new squares are being developed.

Two Bureaus Co-operate in Estimating Loss due to Sugar Cane Moth Borers.—*U.S. Dept. Agric., Bur. Agric. Econ.*, Multigraph, 1 p. New Orleans, La., 17th March 1925.

The Bureau of Agricultural Economics and the Bureau of Entomology have co-operated in estimating the damage to sugar-cane in Louisiana caused by the sugar-cane moth borer [*Diatraea saccharalis*, F.]. Their estimates for the crops of 1922 and 1923 are surprisingly close, though they worked independently with widely different methods. The estimated loss for 1924 was 13 per cent. of a normal or full crop. For 1923 the loss was 23 per cent. and for 1922 it was 17 per cent., and the usual loss has been determined as 19 per cent. The fact that the loss for 1924 was low is attributed to the cold of the previous winter killing borers in exposed pieces of stubble and refuse. The prolonged drought of the summer may also have reduced the number of borers.

WIMMER (E.). **Die Lehre vom Forstschutz.** [The Science of Forest Protection.]—8vo, x+304 pp., 86 figs., 1 portr. Berlin, Paul Parey, 1924. Price 10 *Gold Marks.*

This is the eighth edition of Fürst-Kauschinger's handbook, first issued in 1846. The botanical section and that on unfavourable soil conditions have been recast, while in the entomological portion—covering about half the volume—stress has been laid on the biology of the insects and on the technique of prevention and control. The information given is well up to date, the literature having been consulted up to December 1923.

KLEINE (R.). **Ueber die Larvenminen einiger Orchestini.** [On the larval Mines of some Orchestini.]—*Zeitschr. wiss. Insektenbiol.*, xix, pp. 203–207, 251–254; xx, nos. 2–3, pp. 24–27, 44–53; 43 figs. Berlin, 1924 & 1925.

The various forms of larval mines due to a number of weevils are discussed. The species dealt with are *Rhynchaenus* (*Orchestes*) *fagi*, L., *R.* (*O.*) *quercus*, L., *R.* (*O.*) *testaceus*, Müller, *R. alni*, L., *R. populi*, F., *Tachyerges rufitarsis*, Germ., *T. salicis*, L., *Pseudorchestes pratensis*, Germ., *Rhamphus oxyacanthae*, Marsh., and *R. pulicarius*, Hbst.

RANGNOW (H.). **Beiträge zur Biologie einiger Noctuiden und über vermeintliche oder wirkliche Schädlichkeit ihrer Raupen.** [Contributions to the Biology of some Noctuids and on supposed or real Injury by their Caterpillars.]—*Zeitschr. wiss Insektenbiol.*, xx, no. 3, pp. 62–66. Berlin, 25th March 1925.

Many statements of early authors are copied in modern literature without testing them. The following data are from actual observations in Germany: *Taeniocampa opima*, Hb., in nature has as food-plants *Vaccinium* spp. in forests and *Rumex* spp. in fallow fields, not oak, as stated by Berge. The Noctuid, *Luceria virens*, L., feeds exclusively on grass. *Trachea* (*Hadena*) *basilinea*, F., is not the pest it is supposed to be, for it feeds on *Agrostis spica-venti* found in fields of rye and does not occur in rye fields if the weed is absent. *Parastichtis* (*H.*) *monoglypha*, Hfn., is also supposed to be a serious pest, but actually occurs on such grasses as *Holcus*, *Aira* and *Festuca ovina*. *Scopelosoma satellitia*, L., is another harmless species. *Charaeas graminis*, L., is favoured around Berlin by the development of extensive grassy areas in the woods where previously heather and ferns occurred.

SCHÄTZLEIN (C.). **Schädlingsbekämpfung mit Arsensalzen und Pflanzenwuchs.** [Plant Growth and Arsenical Salts for Insect Control.]—*Anz. Schädlingsk.*, i, no. 3, pp. 25–27. Berlin, 15th March 1925.

The author describes his experiments to ascertain whether and to what extent grape-vines can absorb and be injured by arsenic from a soil containing it. When added experimentally it was absorbed by and did affect the vines, Urania green, 32 milligrammes per 100 grammes of soil, being the form that caused most injury. These considerations do not, however, extend to the use of arsenical insecticides in practice, since the very small amounts of arsenic that enter the soil as a result cannot in any way harm the vines.

Hengl (F.). **Ueber die Ausbreitung und Bekämpfung der Kräuselkrankheit des Weines (Akarinose) in Oesterreich.** [On the Spread and Control of the Mites infesting the Vine in Austria.]—*Anz. Schädlingsk.*, i, no. 3, pp. 27–28. Berlin, 15th March 1925.

Mites infesting the grape-vine are combated in Austria by spraying in winter before the buds are formed with a lime sulphur mixture of 20° Bé. density diluted 3–4 times. Spraying during the vegetation period should only be resorted to exceptionally, and much weaker strengths must be used. The effect of a careful spraying in winter appears to last for several years.

Jablonowski (J.). **Der heutige Stand der Reblausfrage in Ungarn.** [The present State of the *Phylloxera* Question in Hungary.]—*Anz. Schädlingsk.*, i, nos. 2 & 3, pp. 18–19, 28–30. Berlin, 15th February & 15th March 1925.

Soil disinfection with carbon bisulphide and the use of American stocks had reduced *Phylloxera* to such an extent that viticulture in Hungary was in a most prosperous condition prior to the outbreak of the war. War-time and post-war conditions have modified this position very markedly, but given favourable opportunities, the attainment of the former degree of control of this pest is only a matter of time.

Vivarelli (L.). **Entomologia agraria. Vol. I. Insetti nocivi alla vite.** [Agricultural Entomology. Vol. I. Insects injurious to the Vine.]—2nd edn., 8vo, xv+350 pp., 93 figs. Casale Monferrato, Fratelli Ottavi, 1924. Price *Lire* 18·75.

This useful volume, which was first issued in 1912, aims at enabling the ordinary vine grower to distinguish the various insects injurious to the vine and to adopt the best methods for combating them. Brief notes are also given on the morphology and biology of insects, and an appendix contains information on the mites that attack the vine and on the Nematode, *Heterodera radicicola*.

The present, second edition includes numerous additions, especially as regards means of control.

Malenotti (E.). **Istruzioni pratiche per combattere le Tignole dell' Uva.** [Practical Instructions for combating the Vine Moths.]—*Sindacato Agricolo di Campiglia Marittima* (*Pisa*), 10 pp. Campiglia Marittima, 1925.

These brief instructions for combating the vine-moths, *Clysia* (*Conchylis*) *ambiguella*, Hb., and *Polychrosis botrana*, Schiff., contain no new information.

Malenotti (E.). **La raccolta frazionata dei Dormentoni.** [The Collection of Melolonthid Larvae in a Portion of an infested Area.]—*Agricoltura Veneta*, separate, 3 pp. [Verona], 30th August 1924. [Received 24th March 1925.]

Enormous numbers of the larvae of *Melolontha melolontha* (*vulgaris*) were present in a vineyard in June 1924, which had been heavily manured during the two preceding winters with horse dung, but the firm

soil at the foot of the plants was not infested. All the conditions point to the loose manured soil of this particular plot having been attractive to the adult beetles for oviposition in 1923 and 1924. The outbreak was not due to the manure having been infested originally. The larvae were collected and destroyed by extensive diggings at intervals of 10 days, and this method does not appear under such circumstances to be more costly than fumigation with carbon bisulphide.

MALENOTTI (E.). **Un acaro dannoso all' insalata.** [An Acarid injurious to Salads.]—*Agricoltura Veneta*, no. 4, separate, 4 pp., Verona, 28th February 1925.

In Verona lettuce and other salad plants are attacked by the mite, *Penthaleus haematopus*, Koch, which causes the leaves to wither. A local measure consists in covering with finely crumbled earth plants that show signs of withering on the outer, older leaves. After a week the plants are cleared of this covering and are free from infestation. This, however, simply means that the mites have migrated to other plants that have not been so treated, and as reinfestation is inevitable, this burying can only be resorted to 7 or 8 days before picking. Salads picked for the market can be freed from mites by soaking in water. It is suggested that if in picking salads, heads that show infestation be sought for and picked, the field would soon be cleared.

MARTELLI (G.). **La Bianca Rossa degli agrumi. Contro la Cocciniglia del Fico** (*Ceroplastes rusci* **L.**). **Contro la Campa del Mandorlo** (*Malacosoma neustria*). [The Citrus Scale, *Chrysomphalus dictyospermi*. Against the Fig Scale, *C. rusci*. Against the Almond Caterpillar, *M. neustria*.]—*R°. Osserv. Fitopatol. per le Puglie*, Circ. 2, 6 pp. Taranto, February 1925.

The methods advised against *Chrysomphalus dictysopermi*, Morg., on *Citrus* in Apulia are spraying with lime-sulphur, or, where practicable, fumigation with hydrocyanic acid gas. Scraping the branches with the gloved hand is recommended against *Ceroplastes rusci*, L., infesting fig trees; this must be done before the shoots appear in spring. Almond trees require spraying with lead arsenate (1 per cent. paste or ½ per cent. powder) or with ½ per cent. calcium arsenate to destroy the caterpillars of *Malacosoma neustria*, L., before the leaf-buds open.

MARTELLI (G.). **Il verme delle mele,** *Carpocapsa* **dei pomi** (*Carpocapsa pomonella* **L.**). [The Apple Worm, *Cydia pomonella*.]—*R°. Osserv. Fitopatol. per le Puglie*, Circ. 3, 2 pp. Taranto, March 1925.

No new information is given in these notes on *Cydia pomonella*, L., and its control by spraying with lead or calcium arsenate.

MARTELLI (G.). **Il verme dell' uva "Cannedda" Tignoletta dell' uva** (*Polychrosis botrana* **Schiff.**). [The Vine Moth, *P. botrana*.]—*R°. Osserv. Fitopatol. per le Puglie*, Circ. 4, 3 pp. Taranto, March 1925.

The vine moth, *Polychrosis botrana*, Schiff., has three generations a year in Apulia. The first extends from the middle of April to the

end of June, the second from the second half of June to the second half of August, and the third from the second half of August to April in the following year. A spray of 1 per cent. of lead or calcium arsenate should be applied about 10 days after the moths are seen on the wing, *i.e.*, about the middle of May. This should be repeated 10 days later. A third spray, containing 2 per cent. tobacco extract and 1 per cent. soap, should be applied in the middle of July, if necessary.

La campaña contra la mosca olearia en Cenia. [Work against the Olive Fly at Cenia.]—*Bol. mens. olivic. y elaboración moderna de aceite de oliva*, no. 71, p. 476. Tortosa, 1924. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. iii, no. 1, p. 277. Rome, January-March 1925.)

In 1924 about 12,000 olive trees, divided into three lots, were sprayed against *Dacus oleae* with a mixture of sodium arsenate and molasses. Several applications were made. In the first lot all the trees bore healthy fruit; in the second about 3 per cent. of the olives were punctured by the fly, but the punctures completely healed over; in the third, comprising 6,000 trees, not more than 3 per mille of the fruits were punctured. In untreated properties in the immediate vicinity the amount of injury varied from 50 per cent. of the crop (for olives of the " Marons " variety, which are very resistant to attack) to 90 per cent. and over.

La plaga de gusanos en la comarca de Limón. [The Caterpillar Pest in the District of Limon.]—*Bol. Fomento*, v, no. 1, p. 68. San José, Costa Rica, 1924. (Abstract in *Internat. Rev. Sci. & Pract. Agric.*, N.S. iii, no. 1, pp. 277–278. Rome, January-March 1925.)

A caterpillar, identified as *Brassolis isthmia*, appeared near Limon in July 1924, having probably been imported with vegetables or fruit from Andrés Island or Jamaica. It increased extraordinarily, feeding by night with great voracity on sugar-cane, cacao and coconut and, in the absence of these, on banana. For lack of adequate means of control extensive coconut plantations have been destroyed, the apical buds and hearts of the palms being devoured. Energetic measures have been organised in the hope of preventing the further spread of this butterfly.

Theobald (F. V.). **New and little-known British Aphides.**—*Ent. Mo. Mag.*, lxi, pp. 71–81, 7 figs. London, March-April 1925.

The new species described are *Macrosiphum amygdaloides* from *Euphorbia amygdaloides*; *M. corallinum* from a wild Umbellifer; *M. phillipsi* taken in an ant's nest; *Myzus hydrocotylae* from *Hydrocotyle vulgaris*; *Hyadaphis sparganii* from *Sparganium ramosum*; *H. coniellum* from common hemlock (*Conium maculatum*); *Rhopalosiphum rumicis* from dock (*Rumex* sp.); *Aphis lantanaella* from *Viburnum lantana* and *V. opulus*; *A. oxalina* from *Oxalis corniculata*; and *Chaitophorus abnormis* from *Lactuca muralis*.

WALKER (J. J.). **Occurrence of** *Thorictodes heydeni* **Reitt.** (*Cerylon oryzae* **Steph. Coll.) at Kidderminster.**—*Ent. Mo. Mag.*, lxi, pp. 92–93. London, April 1925.

Thorictodes heydeni, Reitt., has been found at Kidderminster in a large kind of millet, probably *Eleusine coracana*, imported from the Sudan for feeding fowls.

TOMLIN (J. R. le B.). **Bostrychids introduced in Bamboo Canes.**—*Ent. Mo. Mag.*, lxi, p. 94. London, April 1925.

Heterobostrichus aequalis, Waterh., and *Dinoderus brevis*, Horn, have been found infesting stored bamboo canes in Cheshire. The stock from which the samples were taken had been infested for several years.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, x, no. 3, pp. 198–200. Pretoria, March 1925.

Gonipterus scutellatus, Gyll. [*R.A.E.*, A, xiii, 38] is now also recorded from the Transvaal, causing very serious injury to *Eucalyptus viminalis*. *Heliothis* (*Chloridea*) *obsoleta* has been the most troublesome bollworm on cotton at Rustenberg. The fruit-eating beetles, *Megalognatha unifasciata* and *M. granulicollis*, have been unusually abundant in orchards in the Transvaal and Natal. *Agonoscelis versicolor*, F. (cluster bug) occurred in large numbers on pepper trees (*Schinus molle*) and saltbush (*Atriplex* sp.); only isolated individuals were found on *Eucalyptus*. The unhealthy appearance of the pepper trees was probably due to these bugs. They may be dislodged from the branches by spraying with water; when on the ground they should be covered with bundles of dry grass (into which they will crawl) and be burnt. The few that escape and crawl up the trees again may be crushed with wet sacks before they get too high up.

TUCKER (R. W. E.). **The Black Sand Mite** (*Penthaleus destructor*, **Tkr.**).—*Jl. Dept. Agric. Union S. Africa*, x, no. 3, pp. 269–270. Pretoria, March 1925.

The eggs of *Penthaleus destructor*, Tkr. (black sand mite) are laid on the lower surface of the lower leaves of the food-plants, especially a weed, *Cryptostemma calendulaceum*. Normally in the Cape Province the eggs hatch in about 7–8 days, but from the end of November to the beginning of May they lie buried or are blown about in the sand, resistant to drought and heat, and hatch when the winter rains begin. The adults appear about 3 weeks after hatching. Almost any weeds, vegetables or cultivated flowers are attacked, a decided preference being shown for lettuce, beets, peas and potatoes and most cultivated flowers. Though the larvae are able to emerge from beneath at least an inch and a half of sand, the adults cannot emerge from even a thin layer and succumb readily to heat and drought. In May to June after allowing a few days for the complete hatching of the summer eggs, it is advisable to dig over or plough and harrow or roll the land; by this means the immature stages are buried and crushed. A trap crop of early peas sown and ploughed under later will concentrate

the majority of the mites that escape the first treatment. They may be killed by spraying with tobacco extract 1 in 80 parts of water, or with various proprietary insecticides. Seed-beds may be protected by a wooden border, round the top of which a band of adhesive 2 inches wide is spread. This should be renewed as required.

MAYNÉ (R.). **Les Vers à soie congolais.**—*Rev. zool. afr.*, xiii, pt. 1, *Bull. Cercle zool. congolais*, pp. (16)–(19). Brussels, 15th February 1925.

Of the 13 species of silkworms recorded from the Belgian Congo the most widely distributed are *Anaphe infracta*, Wals., feeding on *Bridelia micrantha* and *B. scleroneura*; *A. leplaei*, Mayné, also on *Bridelia*; *A. venata*, Butler, on various species of *Albizzia* and *Sterculia*; *Epanaphe carteri*, Wals, on *Macaranga laurentii*; and *E. moloneyi*, Druce, on *Albizzia fastigiata* and *A. intermedia*. Brief notes are given on the habits of these species.

VUILLET (J.). **Utilisation du Sorgho comme plante piège pour la destruction des** *Dysdercus*.—*Rev. Bot. app. & Agric. colon.*, v, no. 42, pp. 147–148. Paris, 28th February 1925.

As a result of experiments made in the French Sudan with an American variety of *Sorghum*, its use is advocated as a trap crop for *Dysdercus superstitiosus*. It should be sown in occasional rows throughout a cotton field.

BARNES (T. C.). **A Preliminary Note upon a Honey-dew Fungus.**—*Canad. Ent.*, lvii, no. 3, pp. 69–71, 1 fig. Orillia, Ont., March 1925.

One of the most striking instances of the oecological relationships between fungi and insects is afforded by the fungus, *Scorias spongiosum*, which grows in the honey-dew excreted by woolly Aphids. The honey-dew fungus here discussed differs considerably from the descriptions of *Scorias spongiosum*. The fungus, which is recorded from various localities in Quebec, forms a buff-coloured spongy mass on the alder beside groups of a woolly Aphid, *Paraprociphilus* (*Prociphilus*) *tessellatus*, on twigs beneath the insects or on the ground to which the honey-dew is constantly dripping. A brief description is given of its appearance, structure and behaviour in a culture medium.

Nursery Stock, Plant and Seed Quarantine. Amendment No. 2 of Revised Rules and Regulations Supplemental to Notice of Quarantine No 37.—*Service & Regulatory Announcements, U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 81, pp. 120–121. Washington, D.C., March 1925.

Regulation 7 of the Nursery Stock, Plant and Seed Quarantine [*R.A.E.*, A, vii, 184; xi, 268, 369] is further amended in respect of certification, marking and packing of nursery stock, plants and seeds imported into the United States as from 20th November 1924.

Blackman (M. W.) & Stage (H. H.). **On the Succession of Insects living in the Bark and Wood of Dying, Dead and Decaying Hickory.**—*N. Y. State Coll. Forestry,* Tech. Pubn. no. 17, pp. 1–269, 14 pls. Syracuse, N.Y., June 1924. [Received 27th April 1925.]

The observations discussed in this paper extended over the period from September 1913 to May 1919 in the vicinity of Syracuse, where an outbreak of *Scolytus* (*Eccoptogaster*) *quadrispinosus*, Say (hickory bark-beetle) had been primarily responsible for the death of all the hickory trees (*Hicoria glabra*) [*cf. R.A.E.*, A, xii, 489]. The changes occurring in the trees after they have been killed by the attack of *S. quadrispinosus* are described. The resulting decay is more rapid if the bark is left on the tree. Each successive year the condition of the decaying tree changes, making it attractive to entirely different types of insects, so that a succession of associations of organisms occurs. Whereas at first the associations are of typically wood-boring insects, their parasites, predators and scavengers, in succeeding years there is a greater proportion of forms living on the products of decay or the fungi largely responsible for the decay. These are again succeeded, particularly if the tree has lain on the ground for several years, by a large number of typical soil-inhabiting forms. *Xyleborus celsus*, Eichh., is one of the most important borers affecting the later history of the tree. As it burrows in the sapwood of the trunk, it mechanically weakens the tree and allows of the more rapid entrance of fungi, which hasten the decay of the wood.

A general account of the succession of insects in the trees is given as well as a consideration of those occurring in various parts of trees in various conditions up to the sixth summer. In preparing the accounts of the individual insects an attempt has been made to review all of the literature bearing upon the habits and biology of each species. A bibliography of some 350 works is appended.

Reinhard (E. G.). **The Wasp** *Hoplisus costalis*, **a Hunter of Tree-hoppers.**—*Jl. Wash. Acad. Sci.*, xv, no. 5, pp. 107–110. Baltimore, Md., 4th March 1925.

The solitary wasp, *Hoplisus costalis*, Cress., stores its nest with the adults of various Membracids. The egg is laid beneath the folded legs of the latter, hatches in two days, and in five days the larva, having consumed the tree-hopper, pupates. The Tachinid, *Pachyophthalmus signatus*, Meig., and the wasp, *Brachystegus hoplisivora*, Rohw., are parasites of *H. costalis*.

Dean (G. A.). **The Corn Borer Situation.**—*Jl. Wash. Acad. Sci.*, xv, no. 6, pp. 136–137. Baltimore, Md., 19th March 1925.

Investigations as to the possibility of the European corn borer [*Pyrausta nubilalis*, Hb.] becoming a serious pest of maize in the United States and Canada show an alarming increase of distribution and infestation in Pennsylvania, Ohio, Michigan and Ontario, while new areas have appeared on Long Island and Staten Island and in Connecticut. In Massachusetts there has been a decrease in intensity of infestation, probably owing to adverse climatic conditions in 1923; in eastern New York there is little alteration in either spread or infestation.

BARBER (G. W.). **A Study of the Cause of the Decrease in the Infestation of the European Corn Borer,** *Pyrausta nubilalis* **Hübn. in the New England Area during 1923.**—*Ecology*, vi, no. 1, pp. 39–47, 2 figs. Brooklyn, N.Y., January 1925.

The subnormal temperatures that prevailed in New England in the late summer of 1923 during the oviposition season played an important part in the decrease of *Pyrausta nubilalis*, Hb. The probable longer periods of life of the adults caused by low temperatures served to spread oviposition over a relatively longer period; this favoured the development of the egg parasite, *Trichogramma minutum*, Riley, and the relatively fewer eggs deposited per female probably served to increase the importance of this parasite.

BARBER (G. W.). U.S. Bur. Ent. **The Efficiency of Birds in destroying over-wintering Larvae of the European Corn Borer in New England.**—*Psyche*, xxxii, no. 1, pp. 30–46, 1 pl. Boston, Mass., February 1925.

Evidence of feeding by birds on larvae of *Pyrausta nubilalis*, Hb., has been found every spring for several years in New England, and this is now attributed to the downy woodpecker, *Dryobates pubescens medianus*, a winter resident in this region, which drills holes into standing stalks in order to reach the overwintering larvae. A similar type of feeding by the chickadee, *Penthestes atricapillus*, has also been observed. Another type of feeding is the shredding of maize stalks that have fallen over, by blackbirds and starlings and probably several other migrating birds. They are also able to shred infested maize stubble, but are apparently unable to reach the larvae contained in standing stalks. Such feeding by birds has mostly been confined to localities that have been heavily infested for several years. Experiments for the purpose of determining whether the habit of feeding on the larvae was general were carried out in representative localities in the infested area of New England in the autumn of 1922 and 1923. The feeding, which was mostly the work of woodpeckers, was found to have been over a much more extended area in the spring of 1924 than in that of 1923.

Field observations have shown that birds also feed in the spring on the pupae of this insect. There is evidence to indicate that birds may help to hold the insect in check or even so to reduce its numbers in some localities during the winter and spring that the damage may not be extensive enough to cause heavy loss to crops in such localities in the following summer.

CULLINAN (F. P.) & BAKER (C. E.). **Liquid Lime Sulphur versus Sulphur Dust for Apple Spraying.**—*Purdue Univ. Agric. Expt. Sta.*, Bull. 283, 22 pp., 8 figs. Lafayette, Ind., July 1924. [Received 24th April 1925.]

The experiment described extended over a period of 5 years from 1918 to 1922. Liquid lime-sulphur was used in all summer and dormant sprays at the rate of 1 U.S. gal. (32° Bé.) to 40 U.S. gals. of water, with the addition of 1 lb. lead arsenate powder to 50 U.S. gals. of

spray material in all sprays except the pink and petal fall, when 1½ lb. were used. The dust consisted of 90 lb. sulphur and 10 lb. lead arsenate, which was used in all applications except one of the petal-fall applications, when an 85–15 dust was used. The results are discussed almost entirely from the point of view of controlling apple scab; the dust, however, will satisfactorily control codling moth [*Cydia pomonella*, L.] and curculio [*Anthonomus quadrigibbus*, Say, and *Conotrachelus nenuphar*, Hbst.], though the relative value of the spraying and dusting against these pests varied in different years. Occasional fruit and foliage injury occurred in connection with the spray.

Burroughs (A. M.). **What Lubricating Oil promises as a Spray.**—*Better Fruit*, xix, nos. 8–10, pp. 11 & 43, 12–13 & 19–20, & 12–13. Portland, Oregon, February-April 1925.

The history of petroleum products as insecticides is reviewed, and the term miscible oil is explained. As petroleum products are the basic ingredients of engine oil emulsions and practically all oil sprays, the nature of petroleum itself is described as well as the different fractions obtained by distillation. This procedure is outlined, but the method employed varies in different refineries. Proprietary miscible oils that are of insecticidal value have as their basic ingredients anything from crude oil to light lubricating oil. Various formulae have been tested and applied in different parts of the United States, some of which are quoted. Various emulsifying agents have also been used. The new method of making oil emulsions without boiling, but at the same time using emulsifying agents other than soap, though still in the experimental stage, promises to be cheaper and just as effective as the oil-soap emulsions for the control of Coccids and possibly Aphids. Other advantages of this method are also pointed out, and the effect of the oil on the trees is discussed.

Peacock (N. D.). **New Spray Materials.**—*Proc. 19th Ann. Convention Tennessee State Hortic. Soc., Nurserymen's & Beekeepers' Assoc.*, pp. 39–43, 1 fig. Nashville, Tenn., January & February 1924. [Received 24th April 1925.]

Recent advances in spraying materials are reviewed, and their preparation is discussed. A lubricating oil emulsion spray [*R.A.E.*, A, xi, 337] is recommended for the control of the San José scale [*Aspidiotus perniciosus*, Comst.].

Niven (L. A.). **Using Paradichlorobenzene for the Control of the Peach Tree Borer.**—*Proc. 19th Ann. Convention Tennessee State Hortic. Soc., Nurserymen's & Beekeepers' Assoc.*, pp. 43–46. Nashville, Tenn., January & February 1924. [Received 24th April 1925.]

This information on the control of the peach-tree borer [*Aegeria exitiosa*, Say] by the application of paradichlorobenzene is largely quoted from the work of O. I. Snapp [*R.A.E.*, A, xi, 534; xii, 311].

MAGILL (W. W.). **Insect and Disease Control in the Peach Orchard.**—*Proc. 19th Ann. Convention Tennessee State Hortic. Soc., Nurserymen's & Beekeepers' Assoc.*, pp. 46–49. Nashville, Tenn., January & February 1924. [Received 24th April 1925.]

The most important insect pests of peaches in Tennessee are the San José scale [*Aspidiotus perniciosus*, Comst.], peach curculio [*Conotrachelus nenuphar*, Hbst.], and peach tree borer [*Aegeria exitiosa*, Say]. The latter is controlled by paradichlorobenzene. The various sprays used against the other pests in the different States are briefly reviewed, and it is considered that the New Jersey dry-mix lime sulphur [*R.A.E.*, A, xii, 48] will gradually replace the self-boiled form, especially for growers with a small acreage.

BENTLEY (G. M.). **Report of Inspections of Nurseries, Greenhouses, Strawberry Plant Fields, Foreign and Interstate Shipments of Nursery Stock, and Sweet Potato Seed and Plants for 1924.**—*Tennessee State Bd. Ent.*, Bull. 44 (xii, no. 1), 87 pp., numerous figs. Knoxville, Tenn., December 1924. [Received 24th April 1925.]

This report covers the period from 1st July 1922 to 1st December 1924. The Mexican bean beetle [*Epilachna corrupta*, Muls.] is now established in 70 counties of Tennessee, and the oriental fruit moth [*Cydia molesta*, Busck] has been taken in several parts of the State.

Department of Entomology.—*37th Ann. Rept. Purdue Univ. Agric. Expt. Sta., 1923-24*, pp. 23–26, 3 figs. Lafayette, Ind., 1924. [Received 24th April 1925.]

The San José scale [*Aspidiotus perniciosus*] is one of the most serious and destructive insects in Indiana orchards, and the standard lime-sulphur sprays, though they have given good results, have not secured complete control of this scale. A deformity of peaches formerly attributed to thrips has now been shown to be caused by the tarnished plant bug, *Lygus pratensis*. The chinch bug [*Blissus leucopterus*] continues to be prevalent in many sections of the State, and tests for its control have been made with creosote, calcium cyanide and other materials. Arrangements have been made for the introduction of corn borer parasites, which also attack the common smartweed borer [*Pyrausta ainsliei*], with a view to having this parasite well established should the corn borer [*P. nubilalis*] penetrate into Indiana.

HOOD (J. D.). **New Species of *Frankliniella* (Thysanoptera).**—*Bull. Brooklyn Ent. Soc.*, xx, no. 2, pp. 71–83, 1 pl. Lancaster, Pa., April 1925.

The species here described are distributed among four major divisions of the genus, which are separable in part on the structure of the pedicel of the third antennal segment. This character has not previously been used in diagnosing the species of *Frankliniella*, but is one which, notwithstanding its minuteness, has been found most satisfactory in the definition of the groups *tritici* and *cephalica*. *F. tritici*, Fitch, and *F. occidentalis*, Pergande, said by some authors to be inseparable from each other, fall into different groups on the basis of this character.

The prolongation of the second antennal segment at its apex is a second valuable characteristic. It occurs in *F. cephalica*, Crawf. (*Euthrips tritici* var. *bispinosus*, Morgan, and var. *projectus*, Watson), and a few of its closest relatives. A third useful structure is found in the armature of the ninth abdominal tergite of the male. Of the four groups recognised, the first, second and fourth occur only in North and South America, so far as is known, and the third and largest embraces all the European and African species studied. The author states that the name *F. tenuicornis*, Uzel, should be used for the species called by Hinds *Euthrips nervosus*, Uzel; *Thrips* (*Euthrips*) *maidis*, Beach, is the same insect. Nine new species of the genus from North and Central America and the West Indies are described.

Chamberlin (F. S.), Tenhet (J. N.) & Böving (A. G.). U.S. Bur. Ent. **Life-history Studies of the Tobacco Flea-beetle in the Southern Cigar-wrapper District.**—*Jl. Agric. Res.*, xxix, no. 12, pp. 575–584, 7 figs. Washington, D.C., December 1924. [Received 24th April 1925.]

The life-history and habits of *Epitrix parvula* are described [*R.A.E.*, A, xi, 570]. The tobacco crop in the southern cigar-wrapper district is attacked by the overwintered brood and by two later generations of this flea-beetle. After the crop is harvested, there may be two or even three additional overlapping broods, which it is impossible to distinguish. Records indicate that the overwintered females deposit a larger number of eggs than those of the later generations, oviposition starting shortly after emergence from hibernation. Moist soil, when available, is always selected for oviposition. When it is not available, eggs are deposited very sparingly, over long periods of time. No eggs are deposited when the daily mean temperature is below 50° F. Temperature also seems to be the deciding factor in regulating the length of the incubation period and the larval stage, which varies from 11 days in midsummer to 41 days in early spring. There is a predominance of females over males, especially in the overwintering and spring generations. Hibernation in the southern cigar-wrapper district is incomplete, and breeding may take place to a limited extent during unusually warm weather.

Doolittle (S. P.). **Control of Cucumber Mosaic in the Greenhouse.**—*U.S. Dept. Agric.*, Dept. Circ. 321, 5 pp., 2 pls. Washington, D.C., July 1924. [Received 7th May 1925.]

Cucumber mosaic, which attacks various cultivated cucurbits, is one of the most serious diseases that affect cucumbers both in the field and in the greenhouse. It occurs throughout the Eastern, Southern and Central United States, and in some parts the greenhouse industry is threatened. Half the plants in a greenhouse may be destroyed in a few weeks, and the losses in a single locality in 1922 were estimated at £15,000. The disease is principally transmitted by insects, particularly *Aphis gossypii*, Glov. (melon aphis) and *Diabrotica vittata*, F. (striped cucumber beetle) [*R.A.E.*, A, ix, 306], but the latter, though it carries mosaic to a large extent in the field, is not sufficiently common in greenhouses during the winter months to be of much importance. The disease is transmitted by any agency that brings a small drop of juice from an infected plant in contact with a slight

wound in a healthy one. It does not arise as a result of unfavourable soil or atmospheric conditions. Pruning instruments that have been used to cut infected plants should be sterilised at once, and healthy plants should not be touched after handling infected ones till the hands have been washed with soap and water. Repeated experiments with thousands of *D. vittata* collected from mosaic-infected fields and kept over winter have failed to show that this insect is responsible for the overwintering of the disease. It has been found, however, that the disease does survive the winter in certain wild plants, particularly wild cucumber (*Micrampelis lobata*), milkweed (*Asclepias syriaca*), pokeweed (*Phytolacca decandra*), and wild ground-cherry (*Physalis* sp.). In the case of the wild cucumber the disease is carried over in the seed, though this is not the case with the cultivated cucumber. The other plants are perennial, and the mosaic disease lives over from year to year in their roots. *Aphis gossypii* and *D. vittata* feed on the shoots of these plants in the early spring, and later migrate to cucumber, thus transmitting the disease from the wild to the cultivated plants.

The control of the disease both in the greenhouse and the field is based on the removal of the wild plants that form reservoirs of the disease and the destruction of the insects that spread it. All the plants concerned should be removed from the vicinity of a greenhouse. It is advisable to fumigate the houses at intervals of 10 days throughout the growing season. Good results may be obtained either by the use of tobacco dust, nicotine paper, or fumigation with hydrocyanic acid gas. The maximum dose of the latter for cucumbers is that generated from $\frac{3}{16}$ oz. sodium cyanide per 1,000 cu. ft. in an overnight exposure. All infected or suspected plants should be cut off as soon as they are discovered.

STEWART (F. C.). **Control of Leafroll and Mosaic in Potatoes by Isolating and Roguing the Seed Plot.**—*N. Y. Agric. Expt. Sta.*, Bull. 522, 14 pp. Geneva, N.Y., August 1924. [Received 21st April 1925.]

As it has been shown that the Aphid [*Macrosiphum solanifolii*] that transmits potato mosaic overwinters in the egg state exclusively on rose bushes [*R.A.E.*, A, xi, 112], it is undesirable to have them in the neighbourhood of seed potato fields. Isolation and roguing of the seed plot cannot be depended upon to control satisfactorily either mosaic or leafroll; nevertheless the practice is to be recommended, as many weak and diseased plants are thereby eliminated. The seed used in starting a seed plot should be as free from leafroll and mosaic as it is possible to obtain, and wherever practicable, use should be made of a greenhouse test; failing this a field test in the early spring, lasting from 7 to 8 weeks, should be carried out.

WEBSTER (R. L.). **Fumigation with Hydrogen Cyanide for Control of Pear Psylla.**—*New York Agric. Expt. Sta.*, Bull. 523, 23 pp., 4 pls. Geneva, N.Y., November 1924. [Received 15th April 1925.]

In this summary of results with hydrocyanic acid gas against *Psylla pyricola* (pear psylla), a description is given of the methods employed in four large pear orchards in western New York. The fumigating

tents were similar to those used in the fumigation of *Citrus* in Southern California. All stages of the Psyllid including the eggs were killed, when leakage of gas through the tents was not excessive, by a concentration of the gas formed by the use of the 75 per cent. schedule of Woglum's chart, which is reproduced. Most of the experimental operations were carried on during daylight without any severe injury to foliage. Where damage occurred, the shade temperature was usually above 80° F. at the time or directly after. Excessive concentration of the gas frequently causes damage even at moderate temperatures. Sunlight is considered the most important factor conducive to injury, but it is often difficult to distinguish between light and heat. Moisture within the leaf also renders the cell walls more permeable to the gas and, therefore, more susceptible to injury. The most severe fumigation injury to foliage occurred with trees fumigated at night, but this was followed by a high day-temperature. Re-infestation of fumigated trees from untreated, adjacent ones, where the insects apparently spent the winter, decreased the value of fumigation work.

Hintze (A. L.). **The Behaviour of the Larvae of** *Cotinis nitida* **Burmeister. (Coleoptera.)**—*Ann. Ent. Soc. America*, xviii, no. 1, pp. 31–34. Columbus, Ohio, March 1925.

Experiments with the larvae of *Allorrhina* (*Cotinis*) *nitida*, Burm., showed that the grubs preferred foods in the following order: Sweet potatoes, Irish potatoes (if the skin was broken), turnips, and carrots. A high soil temperature of 102·2–104° F. [39–40° C.] was preferred. The factors affecting locomotion in the larvae are discussed. They survived immersion in water for 48 hours, but died after 65 hours submergence. Emergence from the soil appears to be a rhythmical phenomenon, occurring usually at night and not primarily dependent upon water content, temperature changes, or the absence of food or light.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.*, v, no. 1, pp. 1–44, multigraph. [Washington, D.C.] 1st April 1925.

Interest in the possibilities of forecasting insect invasions has grown considerably during the last three years, and many papers have been written attempting the correlation of meteorological factors with insect abundance. The situation with regard to grasshoppers in the south-western States is considered threatening. The numbers of Hessian fly [*Mayetiola destructor*, Say] have been much reduced since 1923; in the middle and western States late planting seems to have been very successful. The army cutworm [*Cirphis unipuncta*, Haw.] is reported in serious numbers in some of the central States. Low temperatures during the winter in various parts destroyed large numbers of San José scale [*Aspidiotus perniciosus*, Comst.]. *Aphis pomi*, DeG. (*spiraecola*, Patch) (citrus aphis) has appeared in numbers in Florida north of the region heavily infested in the previous year. The Australian tomato weevil [*Listroderes obliquus*, Gyll. (*nocivus*, Lea)] was a serious pest of turnips in southern Mississippi in the spring of 1925. The celery leaf-tyer [*Phlyctaenia rubigalis*, Hb.] is increasing to such an extent among early-growing vegetables in Florida that considerable damage will result unless active measures are taken against it. The situation with regard to the cotton boll weevil [*Anthonomus grandis*,

Boh.] in Louisiana is, generally speaking, favourable. In the lumber regions from Alabama to Texas, bark-beetles are responsible for considerable loss.

Details of infestations on various crops during the period November 1924 to April 1925 are dealt with under the localities in which they occur.

CLEVELAND (L. R.). **The Ability of Termites to live perhaps indefinitely on a Diet of pure Cellulose.**—*Biol. Bull. Mar. Biol. Lab.*, xlviii, no. 4, pp. 289–293. Woods Hole, Mass., April 1925.

Termites fed on pure cellulose were found after 18 months to be as perfectly normal in every way as those fed on the usual wood diet.

SNYDER (T. E.). **Termites in Buildings.**—*Science*, lxi, no. 1580, p. 389. Garrison, N.Y., 10th April 1925.

The only successful method of preventing termite attack in buildings in the United States is insulation of all untreated woodwork from contact with the ground. The foundation timbers must either be impregnated with coal-tar creosote, or the foundations and lower flooring made of stone or concrete.

The U.S. Bureau of Entomology suggests that the following rules should be included in building regulations to prevent termite attack: That no untreated wood be laid on, or in, the earth; that no untreated beams be laid in concrete without at least one inch of concrete between them and the earth; that no lime mortar be used in foundations, or cellar walls in contact with the earth; and that brickwork extending below the surface of the ground be faced and capped with concrete of at least one inch in thickness.

KIRBY (H.). *Cryptotermes hermsi* **sp. nov. A Termite from Fanning Island.**—*Univ. Cal. Pubns. Zool.*, xxvi, no. 23, pp. 437–441, 12 figs. Berkeley, Cal., 10th April 1925.

Cryptotermes hermsi, sp. n., was collected in Fanning Island, in the summer of 1924, in decayed logs and stumps of coconut.

ROHWER (S. A.). **Five Braconid Parasites of the Genus** *Heterospilus*.—*Jl. Wash. Acad. Sci.*, xv, no. 8, pp. 177–182, 1 fig. Baltimore, Md., 19th April 1925.

The new Braconids described are: *Heterospilus beameri*, from the eggs of *Cicada* sp. in Kansas; *H. cephi*, from *Cephus pygmaeus* in Ithaca, N.Y.; *H. etiellae*, from the larvae of *Etiella zinckenella*, Treits., in pods of chick pea [*Cicer arietinum*] intercepted in quarantine in New York; *H. zeteki*, from a nest of *Nasutitermes ephratae*, Holmg., in Panama; and *H. melanocephalus*, believed to be a parasite of *Melitara junctolineella* and *Cornifrons elautalis* in Texas.

HOFFMANN (C. C.). **Manual para el estudio y la recolección de Lepidópteros en México.** [Manual for the Study and Collecting of Lepidoptera in Mexico.]—*Mem. y Rev. Soc. cient. "Antonio Alzate,"* xli, no. 10–12, pp. 441–525, 16 pls., 44 figs. Mexico, December 1923. [Received 29th April 1925.]

This paper on the Lepidoptera of Mexico includes a list of the species harmful to agriculture there.

DA COSTA LIMA (A.). **Sobre duas especies de Coccideos do genero *Aonidiella* ainda nao assignaladas no Brasil.** [On two Species of Coccidae of the genus *Aonidiella* hitherto unrecorded from Brazil.]—*Egatea*, ix, no. 3, pp. 195–199, 3 figs. Porto Alegre, Brazil, May-June 1924. [Received 2nd May 1925.]

Chrysomphalus (*Aonidiella*) *leivasi*, sp. n., and *C.* (*A.*) *apicata*, Newst., are recorded from a wild species of *Ficus*.

DE AZEVEDO (A.). **Insectos e Fungos.** [Insects and Fungi.]—*Correio-Agric.*, iii, no. 3, pp. 85–86. Bahia, March 1925.

The Scolytid, *Stephanoderes seriatus*, Eichh., is recorded from Bahia in cotton bolls and in the husks of the seeds of *Ricinus*.

CARNEIRO (J. G.). **A broca da bananeira em Santos** (*Cosmopolites sordidus*, **Germar**). [The Banana Borer at Santos.]—*Rev. Soc. rur. brasileira*, vi, no. 57, pp. 80–81, 2 figs. S. Paulo, March 1925.

The weevil, *Cosmopolites sordidus*, Germ., has been observed in banana plantations at Santos.

EFFLATOUN (H. C.). **A Monograph of Egyptian Diptera. (Part II. Fam. Trypaneidae.)**—*Mém. Soc. R. ent. Egypte*, ii, pt. 2, 132 pp., 3 figs., 5 pls. Cairo, 1924. [Received 20th April 1925.]

The sequence in which the families are dealt with in this monograph [*cf. R.A.E.*, A, xi, 389] is not intended to show any natural relationship. The Trypetids have been selected for Part ii partly owing to the great economic importance of some members of the family. Of the 38 Egyptian species, *Ceratitis capitata*, Wied., which is common, is one of the most dangerous pests in the world. *Dacus oleae*, Gmel., *D.* (*Chaetodacus*) *zonatus*, Saund., and *Myiopardalis pardalina*, Big., have not yet been recorded from Egypt, but their descriptions are included as their occurrence is possible at any time in spite of the precautions taken to prevent their introduction.

KIRKPATRICK (T. W.). **Notes on the Fungus, *Rhizopus nigricans*, Ehr., in Relation to Insect Pests of the Cotton Plant in Egypt.**—*Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 54, 28 pp., 3 figs. Cairo, 1925.

Rhizopus nigricans is the cause of considerable loss in the cotton crop in Egypt, and enters the bolls through the punctures made by insects. The Pentatomid, *Nezara viridula*, L., and the Capsid, *Creontiades pallidus*, Ramb., carry the spores from one boll to another by means of their rostrum ; the former is seldom very numerous and may be considered a minor pest, but the latter is frequently abundant and injurious during the early part of the maturing period of the bolls. It feeds and breeds on cotton from about May until the beginning of August, when the numbers rapidly decrease ; towards the end of October it reappears, but in much smaller numbers. The reason for this fluctuation is not known ; it is possible that aestivation occurs, but this has not been observed. All stages of the insect feed

on buds and green bolls, causing shedding, but it is the attack on the larger bolls that is important in connection with the spread of the fungus. As the bug is only present in numbers up to about mid-August, it follows that only the early-maturing bolls are liable to be infected by it.

The bollworms, *Earias insulana*, Boisd., and *Platyedra* (*Gelechia*) *gossypiella*, Saund., are more often the causes of infection. The larva of *E. insulana* maintains throughout its growth a hole in the carpel wall on which the spores carried by the wind may fall, while the exit-holes made by *P. gossypiella* afford another means of entry. The effect of infection is to make the boll turn soft and of a reddish-brown colour and then hard, but if it is on the point of maturity when infection takes place this is usually confined to the lock or locks in which the fungus gained entrance and the remaining locks may produce normal lint. In an experiment to ascertain the extent to which the fungus increases the damage caused by insect pests it was found that when the loss of crop reached 40 per cent. almost exactly one-fourth of this loss was directly due to *R. nigricans*. The presence of the fungus in a boll has no effect on the larvae of *P. gossypiella*, but the moth does not so readily oviposit on infected bolls.

In an appendix the author criticises Gough's theory that the attack of *P. gossypiella* reduces the weight of the sound seeds in infested bolls [*R.A.E.*, A, vii, 489]. At the time when the experiments were carried out, the great reduction in weight caused by the attacks of the bug, *Oxycarenus hyalinipennis*, Costa, was very little realised, and it is essential that for comparison of seed weight, samples should be picked at frequent intervals to minimise the loss caused by this bug, and only samples maturing at the same time can be justly compared with each other. From experiments described by the author, in which attacks by *O. hyalinipennis* were reduced to a minimum by frequent pickings, it seems that there is a small reduction only in the weight of sound seeds consequent on attacks by *P. gossypiella*. The apparent loss in germinative power of sound seed in bolls attacked by *P. gossypiella* should also be attributed to *O. hyalinipennis*.

TEMPLETON (J.). **Ratoon Cotton in Egypt.**—*Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 55, 14 pp. Cairo, 1925.

One of the reasons for changing from the perennial to the annual method of cotton cultivation in Egypt was the greater liability of the former to damage from insect pests. The perennial varieties of cotton were thought to give shelter during the winter to the bollworms, *Earias insulana* and *Platyedra* (*Gelechia*) *gossypiella*, and so largely increase the attack in the following season, and the practice of growing cotton as a perennial was finally forbidden by law in 1912. The author, however, does not consider this justified ; and preliminary experiments indicate that the yield from ratooned plants in the second year is greater in amount and equal in quality, that the crop matures earlier, and that loss from bollworm attack is less. After the last picking of the first year, numerous green bolls infested with either *Earias* or *Platyedra* remained on the plants. In February the plants were cut to within 20 inches of the ground, the cut branches being at once burnt. In this way all larvae, whether in the bolls (both species) or in the tips of the branches (*Earias* only), were destroyed.

KIRKPATRICK (T. W.). **The Buff-backed Egret** (*Ardea ibis*, **L., Arabic Abu Qerdan) as a Factor in Egyptian Agriculture.**—*Minist. Agric., Egypt*, Tech. & Sci. Serv., Bull. 56, 28 pp. Cairo, 1925.

Since the protection of the egret in Egypt has been enforced and its re-establishment in the country ensured (1912–1918), it is said to have proved of immense value in keeping down insect pests. A study has therefore been made of the stomach contents of many of these birds at all seasons of the year, detailed lists of the results being given. While it is very difficult to arrive at any definite decision on the economic status of the bird, such reports as the saving of crops to the value of two or three million pounds in a year have been greatly exaggerated. Among Orthoptera, which form a large proportion of the food, especially during the summer, the only species definitely known as a regular pest is the mole-cricket, *Gryllotalpa gryllotalpa* (*vulgaris*). Many other species eaten might easily become dangerous if some controlling factor happened to be removed. Among Coleoptera, the destruction of beneficial Carabids probably at least counterbalances the few injurious species eaten. Among Lepidoptera, the activities of the bird are wholly beneficial, though the destruction of fully-fed cutworms of the final spring generation may be negligible. Against this also must be set the fact that parasites of cutworms are destroyed and many Syrphids eaten in the spring. Outbreaks of Aphids are undoubtedly caused by the destruction of their most important enemy, *Syrphus corollae*. In the author's opinion, if the Orthoptera are omitted, the egret does about an equal amount of good and harm among insects.

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa*, x, no. 4, pp. 290–291 & 297–298. Pretoria, April 1925.

Gonipterus scutellatus is recorded from fresh localities attacking *Eucalyptus viminalis*. The fruit moths, *Sphingomorpha chlorea* and *Achaea lienardi*, caused considerable damage in the Orange Free State and in the east of the Cape Province. Large numbers of the moths were attracted to poison baits of sodium arsenite, sugar and water flavoured with vinegar and pineapple juice. The cockchafer, *Adoretus cribrosus*, has appeared suddenly in large numbers in the Transvaal, destroying maize and flower and vegetable garden plants. In gardens hand-picking and spraying with an arsenical are recommended.

Diaspis echinocacti, originally distributed for the control of its natural food-plant, prickly pear, has proved of little value in this connection, and has now appeared at Grootfontein as a pest of the spineless cactus (*Opuntia* sp.). Spraying experiments are being made for its control, lime-sulphur having given encouraging results.

Among the more important pests of lucerne are the larvae of *Colias electra* and *Heliothis obsoleta* (*armigera*). The best method of control is premature cutting or grazing the badly infested fields. The migration of the caterpillars from mowed land to adjoining fields may be prevented by irrigation furrows filled with water. Spraying should be tried if animals can be kept away. A strip of lucerne should be left all around the field (in very large fields also across them), and should be sprayed with lead arsenate, 5 lb. paste to 100 gals. water. After

about 7-10 days the strips should be mowed and the poisoned hay burned. Paris green 10 oz. to 100 gals. may be used instead of lead arsenate.

Insect Powder Plant (*Pyrethrum cinerariaefolium*).—*Jl. Dept. Agric. Union S. Africa*, x, no. 4, p. 338. Pretoria, April 1925.

Chrysanthemum (*Pyrethrum*) *cinerariaefolium* may possibly be grown on a commercial scale in South Africa. Instructions are given for the harvesting of next season's crop, as well as information as to where the seed may be obtained.

[**Notes on Aphids.**]—*Jl. Dept. Agric. Union S. Africa*, x, no. 4, p. 366. Pretoria, April 1925.

The systematic study of the Aphids of South Africa is being continued, 65 species having so far been recorded. *Toxoptera graminum* has been found on wheat, barley, oats, rye, maize, kaffir corn [*Sorghum*], teff grass [*Poa abyssinica*] and 4 species of native grasses. It is thus able to reproduce throughout the year, which makes artificial control exceedingly difficult. The encouragement of natural enemies appears to be the most efficient measure.

Locust Expedition to the Kalahari. Bechuanaland Protectorate.—*Union S. Africa Dept. Agric.*, Press Circ. no. D.6. of 1924, 10 pp., multigraph. Pretoria, 2nd November 1924. [Received 18th April 1925.]

The general arrangements and the country covered by the expedition are described in detail. In outlining the recommendations for locust destruction, it is pointed out that operations in the Protectorate should be confined to the cordon system, the cordons being made as wide and as effective as possible. Flying swarms should be destroyed along the eastern border of the Protectorate and other areas as may be recommended from time to time. The finding of an assured market for dried locusts would ensure the full assistance of the natives, whereas at present they confine themselves to catching sufficient for their domestic consumption.

The possible use of camels and mechanical transport including aeroplanes for the work is discussed. A report on the mechanical transport used on the present mission is appended.

Munro (H. K.). **Fruit-flies of Wild Olives. Notes on the Bionomics of Fruit-flies (Trypaneidae : Diptera) infesting the Fruits of Wild Olives** (*Olea* **spp.) in South Africa.**—*Union S. Africa Dept. Agric.*, Ent. Memoir no. 2, pp. 5–17, 4 pls. Pretoria, 1924. [Received April 1925.]

The investigations recorded extended over the period from April to December 1922. *Dacus oleae*, Gmel. (olive fruit-fly) has been reared from the wild olive (*Olea verrucosa*) in South Africa ; *D.* (*Chaetodacus*) *biguttulus*, Bez., infests black ironwood (*O. laurifolia*), bastard ironwood (*O. foveolata*), and *O. woodiana*. *Munromyia nudiseta*, Bez., and Lepidopterous larvae, *Hendecasis* sp., have also been found in the fruits of bastard ironwood. *O. woodiana* is also attacked by *Hendecasis* sp., and the Drosophilid fly, *Zaprionus vittiger*, Coq.

The life-history of *M. nudiseta* has not yet been fully worked out. The adults emerge from the beginning of May to the middle of October, and lay their eggs on the ripe fruit, either on the tree or on the ground. Some adults live for 8 or 9 months, and lay a few eggs in the next season's fruit. The egg and larval stages together extend over a period of about 9 months. Pupation occurs in the seed and lasts on the average about 60 days under laboratory conditions. The larval stage lasts about 3 months. A species of *Bracon* was reared from the infested fruit, but only 8 parasites to 30 fruit-flies. Another species, probably *Eupelmus* sp., is possibly a hyperparasite.

Under normal conditions *Dacus biguttulus* has two generations in the year. The eggs of the first generation are probably laid on *O. woodiana* about the middle of April. The first pupae were found in the middle of May, and the first adults emerged in the middle of June. The larval stage lasts five or six weeks, and the pupal stage about four. The eggs of the second generation are apparently laid on the late crops of *O. foveolata*. The first pupae of this generation appear in the middle of August, and the adults emerge from the end of September to the middle of October. The larvae live in the pulp of the fruit, and under normal conditions the fruit falls to the ground about the time the larva is full grown; if the fruit does not fall, the larva makes its way out and drops to the ground, where it burrows into the soil and pupates. In the insectary pupation occurred in the dried remains of the fruit.

Pettey (F. W.). **South African Psyllids.**—*Union S. Africa Dept. Agric.*, Ent. Memoir no. 2, pp. 21–30, 3 pls. Pretoria, 1924. [Received April 1925.]

Both sexes are described of *Arytaina acaciae-baileyanae*, Frogg., which the author considers should be placed in this genus rather than in *Psylla*. *Diaphorina* (*Euphalerus*) *acokantherae*, sp. n., on *Acokanthera venenata*, and *D.* (*E.*) *natalensis*, sp. n., on *Rhus excisa*, are described from Natal. Brief notes are given on other new species, details of which are to be published later; they include *Arytaina mopanei* abundant on mopane trees (*Copaifera mopane*) in the Transvaal; *Diaphorina* (*E.*) *punctulata* on *Sclerocarya caffra*, *Cordia caffra* and *Clausena inaequalis* in Natal; *D.* (*E.*) *carissae* on *Carissa* sp. in Zululand; *Rhinocola crotalariae* on *Crotalaria capensis* in Natal; and *Pauropsylla trichaeta* on a native fig tree in the Transvaal, associated with galls resembling those made by *Trioza merwei*, Pettey.

Pettey (F. W.). **Report of Orchard Spray Experiments at Elsenburg during the 1922-23 Fruit Season.**—*Union S. Africa Dept. Agric.*, Ent. Memoir no. 2, pp. 33–45. Pretoria, 1924. [Received April 1925.]

Experiments in the control of codling moth [*Cydia pomonella*, L.] and red scale [*Chrysomphalus aurantii*, Mask.] are described in detail. The seasonal history of *C. pomonella* as occurring in pears in Elsenburg is recorded. The results of spraying indicate that lime-sulphur or Bordeaux, when used as a combination spray with lead arsenate, at the concentration usually advised, does not destroy the efficiency of acid lead arsenate against *C. pomonella* to any appreciable extent. Growers are therefore advised to use a fungicide with an acid lead arsenate

at no less concentration than 1¼ lb. powder or 2½ lb. paste in 40 gals. of diluted Bordeaux or lime-sulphur. A weaker solution has not proved satisfactory. Calcium caseinate or resin soap spreaders do not improve the efficiency of lead arsenate in this connection; both improve the spreading power of the arsenate, but it is doubtful whether the addition of a spreader would pay a careful sprayer for the increased cost of spray material.

For *C. aurantii* on pears, a late winter dormant spray of lime-sulphur, diluted 1 : 10, and giving a concentration of about 4° Bé. at that dilution, followed by one foliage spray of the same material, diluted 1 : 50, applied at the time of the second application for codling moth, appears effective on late blossoming varieties, which allow the dormant applications to be made when the temperature is comparatively warm and there is less rainfall following. On other pears the same treatment as above, but using two foliage sprays before blossoming, is effective. Application of concentrated lime-sulphur, diluted 1 : 50, after blossoming is attended by risk of foliage injury. Four applications of self-boiled lime-sulphur after the dormant spray (two before blossoming and two afterwards in the first two codling moth sprays) are apparently effective, but this material was found to be difficult to make of constant strength and to clog the nozzles; it also did not control *Fusicladium* and is therefore not recommended. One late winter dormant spray of miscible oil, diluted 1 : 15, was effective. While a calcium caseinate spreader made practically no improvement in the efficiency of lime-sulphur in 1922, it considerably improved its efficiency in 1921.

FULLER (C.). **White Ant Experiments: Tests of the Resistancy of Timbers.**—*Union S. Africa Dept. Agric.*, Ent. Memoir no. 2, pp. 81–104, 4 figs. Pretoria, 1924. [Received April 1925.]

A preliminary account of these observations has already been noticed [*R.A.E.*, A, ix, 530]. In the present paper a general account is given of the habits and nature of termites occurring in South Africa. The destruction of woodwork is almost entirely due to one species and a group containing six or more types so much alike in form and habit that for all practical purposes they may be treated as one (*Odontotermes badius* and *Macrotermes natalensis*, s. lat., with its congenerics, *M. bellicosus*, *M. swaziae*, *M. usutu*, *M. ukuzii*, and possibly *M. waterbergi*). So far as the Union of South Africa is concerned, the destruction by termites of wood used for building purposes is confined to the more northern parts. The experiments here described were carried out in the Transvaal and at Durban. Four examinations were made of the material under experiment at Durban and three in the Transvaal, the intervals between the examinations varying between 9 and 17 months. In the Transvaal the results were somewhat confused by the decay of the sapwood, which predisposed the timber to attack, whilst at Durban an ant, *Pheidole punctulata*, had established itself on the buried timber, covering some of the pieces and probably effectively protecting them from attack by termites. However, it is concluded that 13 of the native timbers are immune from attack, 4 largely immune, and 5 readily attacked. The species of timber concerned are discussed under these three headings.

A summary is given of C. B. Simpson's work on similar lines, compiled from details and particulars already published. These experiments also included the testing of various preservatives, the outstanding feature of which is the degree of immunity conferred on ordinary deal by dressings of strong arsenical solutions, equivalent to 12 oz. of sodium arsenite dissolved in 1 gallon of water. The treated wood was untouched for just over three years. A list is given of other materials tested.

Quarantine Proclamation No. 133.—*Commonwealth of Australia Gaz.*, no. 18. Melbourne, 26th February 1925.

The introduction into Australia of banana plants and bananas grown in Fiji is prohibited unless, in the case of the plants, the chief Quarantine Officer is satisfied that no beetle borer of the genus *Sphenophorus* exists in Fiji, and, in the case of the fruit, it is certified to be from areas free from Sigatoka disease.

Girault (A. A.). **Two New Thysanoptera from Queensland.**—*Insecutor Inscitiae Menstruus*, xiii, no. 1–3, pp. 34–35. Washington, D.C., April 1925.

Euthrips bilongilineatus, sp. n., and *E. biguttaticorpus*, sp. n., are recorded on banana, from Queensland. The latter is the cause of a leathering of the fruit, known locally as "banana rust."

Jarvis (H.). **Fruit Fly Investigation.**—*Queensland Agric. Jl.*, xxiii, pt. 3, pp. 185–187. Brisbane, March 1925.

The fruit-fly, *Dacus ferrugineus*, F. (*Chaetodacus tryoni*, Frogg.) frequently oviposits in hard and immature fruit, leaving maturing fruit unattacked, and importance is therefore attached to clearing away and destroying, early in the season, all the immature fruit (however small) from under the trees. *Dacus cucumis*, Frogg., a cucumber and melon fruit-fly, has recently been bred from papaya fruit [*Carica papaya*]. Trees in sheltered situations are generally more subject to attack by *D. ferrugineus* than those in exposed ones, whether they carry a crop of fruit or not, and trapping should be more successful in such trees. The theory that an orchard infested with fruit-fly in one season will be regularly infested in each succeeding year does not seem to be borne out. The absence, or partial absence, of fruit-fly is apparently due largely to meteorological factors of a special character. Various remedial measures tried in the course of the year, such as trapping, repellents, poison-baits, sprays, etc., have as yet proved ineffective. The only really satisfactory measure is the prompt and systematic gathering of all maggot-infested fruit, both on the ground and on the trees, and this should be immediately boiled to destroy the grubs. The danger of native fruits furnishing suitable media for the propagation of fruit-fly is a very real one. The native food-plants of certain species of fruit-fly that visit the district annually have been discovered, and the flies bred and identified from these fruits. Maggots of *D. ferrugineus* have recently been found in mulberries in one district.

The work done by *Aphelinus mali*, Hald., in destroying woolly apple aphis [*Eriosoma lanigerum*, Hausm.] is most encouraging, and it is hoped to extend its activities to other parts of the State.

JARVIS (E.). **Entomological Hints to Canegrowers.**—*Queensland Agric. Jl.*, xxiii, pt. 3, pp. 242–243, 1 pl. Brisbane, March 1925.

Watch should be kept by canegrowers in Queensland for the appearance of caterpillars of *Cirphis unipuncta*, *Remigia* (*Mocis*) *frugalis*, *Laphygma exempta*, etc. The methods of drawing a furrow across their track and of poisoning with baits are described. Termites can be destroyed by burning infested logs or timber close to headlands ; fence posts, etc., might be treated with 1 part white arsenic to 6 parts of molasses. Termitaria, when located, should be fumigated with carbon bisulphide. On river-flats, where sugar-cane borers are likely to occur, watch should be kept for the weevil [*Rhabdocnemis obscura*] ; its Tachinid parasite [*Ceromasia sphenophori*] will be sent by the Sugar Bureau to Queensland growers provided that they will agree to leave at least a quarter of an acre of uncut grub-infested cane for the parasites to breed in. This should remain uncut for about 3 months and should not be burnt. Instructions are given respecting the use of carbon bisulphide against [*Lepidoderma*] *albohirtum* (grey-back cockchafer). During ploughing operations the grubs should be collected, as both *L. albohirtum* and *Lepidiota frenchi* are likely to do much damage from September to November.

JARVIS (E.). **The Exoskeleton in *Lepidoderma* as an influencing Factor in the Economy and Control of our Grey-back Cockchafer.**—*Queensland Agric. Jl.*, xxiii, pt. 3, pp. 244–248, 1 pl. Brisbane, March 1925.

A study of the external anatomy of *Lepidoderma albohirtum*, Waterh. (grey-back cane beetle) leads to certain suggestions or modifications with regard to control measures. The possession of highly-specialised antennal organs suggests that either sex may be lured into suitable traps by means of attractive odours. The coriaceous texture of the exoskeleton, the structure of the organs of flight and the light weight of the adults indicate that aerial transportation is probably a large factor in the dissemination of the beetles, and this must be taken into consideration in planning control measures. Examination of the exoskeleton proves the impossibility of tunnelling through hard soil, and the structure of the mandibles and maxillae indicates the diet of the beetles and suggests the possibilities of collection, which is most successfully done at daybreak after jarring the trees upon which the beetles feed at night.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiii, pt. 3, pp. 248–250. Brisbane, March 1925.

Termites seem likely to be of considerable importance in the problem of sugar-cane growing ; they enter the sets at the cut ends, and after destroying the softer portions, attack the growing buds and young shoots, which they frequently kill. *Mastotermes darwiniensis*, Frogg., is commonly distributed in parts of northern Queensland, and it is likely, after swarming, that many females may alight on cane land, and, losing their wings, may be compelled to remain and, if possible, breed there. Experiments in cages have shown that applications of $\frac{1}{32}$ oz. of paradichlorobenzene killed all termites present in 6 days. Sets were also well protected by dipping them into solutions of 1 to 2 lb.

Paris green or lead arsenate in 24 gals. of water. Dipping in carbolineum gave inconclusive results, but deterred 40 per cent. of termites from entering the cut ends. Covering the eyes and ends with coal-tar proved a satisfactory repellent; the sets were planted 4 in. deep, and 3 weeks later were germinating normally. Other promising treatments were dipping in an emulsion of ½ lb. hard soap, 2 gals. kerosene and 1 gal. water, used at 10 per cent. strength, adding 1 oz. sodium arsenite to each gallon of the emulsion; and using dehydrated tar as a deterrent.

The use of various soil fumigants against cane grubs is discussed; the best time for applying them is to begin about a fortnight after the first appearance of the beetles. Favourable seasons for this method occur when emergence takes place in October or early November, when most of the cane is still young and the ground free from excessive moisture. When emergence is in early December, fumigation can generally be practised during the latter half of that month and most of January.

Proceedings of the First Pan-Pacific Food Conservation Conference held under the auspices of the Pan-Pacific Union, Honolulu, Hawaii, July 31 to August 14, 1924.—*Mid-Pacific Mag.*, xxix, nos. 1–4, pp. 1–224, 301–480, 501–596, 601–680+16, numerous pls. Honolulu, January-April 1925.

In the course of the discussion on the various phases of food conservation the importance of insects as destroyers of both growing crops and stored food-products was pointed out, and the value of quarantine measures to prevent the introduction of fresh pests was discussed by C. L. Marlatt, who gave several illustrations of the way in which some serious pests have been introduced and have become established in the United States. The work and equipment of ports of inspection was discussed by E. M. Ehrhorn. T. D. A. Cockerell, in considering the need for building up a better knowledge of the insect pests and plant diseases in the Pacific region, urged the organisation of a permanent committee to investigate insect and plant pests and other related subjects in the whole Pacific region and, when necessary, in other regions, such as the West Indies, that may have frequent commercial intercourse with Pacific countries. In discussing an entomological programme for research in the Pacific, a resolution proposed by H. Osborn was adopted to the effect that, in view of the great need for a comprehensive abstract service in all branches of biological science the Conference commends the efforts of the Union of Biological Societies to secure the co-operation of different organisations devoted to such work, and expresses the hope that the services hitherto rendered by the International Catalogue, including the Zoological Record, may be continued and expanded to meet modern requirements. The Conference strongly urged that adequate funds should be provided to put this service on a secure and permanent basis.

L. O. Howard addressed the meeting on the subject of "Co-operation in the Study and Distribution of Insect Parasites." The introduction of parasites of sugar-cane pests in Hawaii was reviewed by O. H. Swezey. Various resolutions were passed urging the continuation and broadening of this work, and therefore larger expenditure of funds by governments and other organisations. A brief account of

economic entomology in New South Wales and the attempted control of prickly pear (*Opuntia*) by means of insect and other enemies was given by J. H. Carruthers. With regard to grasshopper control, C. F. Baker urged general co-operation of the various governments concerned in order to obtain maximum efficiency with a minimum expenditure.

A " termite shield," described by S. F. Light, consists of a continuous metal layer through the foundations of buildings, some distance above the ground if they are in the form of pillars, or resting throughout on the ground. The free edge of this shield should project on all sides two or more inches, and should be bent down from about the middle to form a continuous hanging or vertical edge. Heavy galvanised sheet iron is recommended for this purpose.

The papers, published at length, include "Plant Quarantine Needs within the Pacific Area," by C. L. Marlatt, pp. 543–553; " Insects affecting Sugar-cane in some South American Countries," by F. X. Williams, pp. 581–585; and " Insects in relation to the New Zealand Food Supply," by R. J. Tillyard, pp. 665–680.

In the last-named paper the native and introduced pests are arranged under the orders of the insects concerned, and the possible modification of the insect fauna by the introduction of beneficial insects is considered. Some of the major pests arranged in order of their economic importance are :—Orchard pests : *Pseudococcus maritimus* and *P. comstocki* in pip-fruit orchards ; *Typhlocyba australis* (apple leaf-hopper) ; *Perrisia pyri* (pear leaf-curling midge) ; *Forficula auricularia* (earwig) ; *Bryobia praetiosa* (*pratensis*) (red mite) ; *Cydia* (*Laspeyresia*) *pomonella* (codling moth) ; *Eriophyes pyri* (pear-leaf blister mite) ; and *Tortrix excessana* and allied species. Pests of farm lands : Larvae of *Odontria* spp. and *Porina* spp., destroying grasses; and Noctuids. The San José scale [*Aspidiotus perniciosus*] and *Eriosoma lanigerum* (woolly aphis) are of less urgent importance as they appear to be effectively controlled.

Entomology.—*Rept. Comm. Expt. Sta. Hawaiian Sugar Planters' Assoc., 1923-24*, pp. 13–32. Honolulu, 1924. [Received 24th April 1925.]

The foreign entomological work of the Association is discussed by F. Muir, who suggests that attention should be directed primarily to securing natural enemies of the sugar-cane borer, *Rhabdocnemis obscura*, and the corn aphis [*Aphis maidis*]. Parasites of an allied Coleopterous cane-borer have been forwarded from Mexico, and Celebes is considered a likely place for obtaining suitable parasites, as *R. obscura* occurs there. Two other species of *Rhabdocnemis* occur in the Philippines. Syrphid flies from South America are considered likely to be valuable enemies of the corn aphis, and they would probably attack the cane aphis [*Aphis sacchari*] also. Cutworms are an important pest, and it is hoped that it will be possible to establish certain parasites of them from Mexico and Australia.

A report of entomological projects in general is given by O. H. Swezey. No serious outbreak of sugar-cane leafhopper [*Perkinsiella saccharicida*] occurred during the year, and this pest was apparently kept in check by the bug, *Cyrtorhinus mundulus*. Little damage from *Rhabdocnemis obscura* has been noted owing to the New Guinea Tachinid [*Ceromasia sphenophori*], although in one district this parasite seems to have been less effective of late years. Investigations showed

that parasitism by this Tachinid is low during the winter season, being only 11 per cent. up to March, and 5·1 per cent. in April, rising in June to 24 per cent. and in September to 66 per cent. *Anomala* [*orientalis*] is still confined to the region occupied in past years, the grubs apparently being kept in check by *Scolia*, these wasps being also of assistance in controlling the larvae of *Adoretus* [*sinicus*]. A bad outbreak of army-worms was reported on several sugar-cane plantations in the spring, especially in the proximity of nut grass [*Cyperus rotundus*], which is a favourite food-plant of one of the army-worms (*Spodoptera mauritia*). The Mexican army-worm parasite (*Euplectrus platyhypenae*) was reared in the insectary throughout the year, and colonies were distributed to any plantations known to be infested. Another army-worm parasite (*Apanteles militaris*) was received from Mexico. Less damage by wireworms was reported in one district, but injury to eyes of seed cane was caused by the larvae of *Alphitobius lateralis*, a small Tenebrionid. A colony of 16 adults and 11 larvae of a Carabid beetle (*Scarites* sp.) was collected in Brazil; this may prove to be a valuable enemy of wireworms, as well as of the grubs of *Anomala*, *Adoretus* and Fuller's rose beetle [*Pantomorus godmani*]. Considerable damage was done in the latter part of 1923 in a number of swampy places by mole-crickets [*Gryllotalpa africana*], which ate the eyes from most of the cane seed before it could germinate. The cocoons of two Hymenopterous parasites of mole-crickets, *Larra americana* and another species of this genus, were imported from Para. Experimentally, they readily oviposited on the mole-crickets but failed to develop. Cocoons of a wasp (*Podium haematogaster*) attacking cockroaches were also introduced from Para, but as the natural host there was not the same species it is doubtful whether their establishment will be successful. *Notogonidea luzonensis*, the parasite of field-crickets [*Gryllus*] introduced from the Philippines in 1922, has now spread all over Oahu. Several natural enemies of mealy-bugs [*Pseudococcus*], both predacious Coccinellids and parasites, were found in British Guiana, but did not survive during transport to Hawaii. One of the former fed particularly on the cane mealy-bug, *Pseudococcus sacchari* and another on *Aphis maidis*. The various mealy-bugs in Hawaii have to some extent their special enemies, and *Pseudococcus calceolariae* is thoroughly controlled by a parasite that does not attack the large pink mealy-bug (*P. sacchari*). The avocado mealy-bug, *P. nipae*, is now controlled by a parasite introduced from Mexico. Two egg-parasites (*Phanurus* sp. and *Telenomus* sp.), attacking the eggs of a bug (*Zelus rubidus*) nearly related to the assassin bug, *Zelus renardii*, were found in Mexico and imported, but it is not yet known if they have become established. *Z. renardii* was formerly considered very beneficial on account of its being predacious on *Perkinsiella saccharicida*, but it has now been found to feed also on several Coccinellids and other beneficial insects, including *Scolia* and *Cyrtorhinus mundulus*, so that it is doubtful whether it is more beneficial than injurious.

Various projects in Hamakua are discussed by C. E. Pemberton. Investigations are being carried on to determine the extent of parasitism by *Ceromasia sphenophori* on *R. obscura*, and to learn why control by this parasite is less satisfactory than in other parts of Hawaii. As no natural enemies of the fly have been discovered, the difficulty is attributed to climatic conditions. Parasitism in short ratoons is higher than in long ones, bearing out the theory that the cane-borer

thrives in accumulations of trash. The harder varieties of cane show less damage; they are more open and strip more easily, thus inducing better parasitic control of the borer. The army-worm parasite, *Euplectrus platyhypenae*, imported from Mexico, is thought to have established itself in sugar-cane fields at Honokaa. Experiments have recently been carried out with the centipede, *Mecistocephalus maxillaris*, in its relation to wounds on cane roots, the damage caused by the adult being severe. *Aphis maidis*, the present-known carrier of sugar-cane mosaic in Honokaa, is particularly prevalent on two grasses, one of which, *Syntherisma* sp., is very common and frequently shows heavy mosaic infection. Large colonies of *Cyrtorhinus mundulus* were found on maize badly infested with corn leaf-hopper [*Peregrinus maidis*], but this bug does not normally attack this host.

Sreenivasa Rao (H.). **Further Experiences with the Rhinoceros Beetle.**—*Jl. Mysore Agric. & Exptl. Union*, vi, no. 4, pp. 192–193. Bangalore, 1924. [Received 28th April 1925.]

The chief damage to coconuts done by the rhinoceros beetle [*Oryctes rhinoceros*, L.] is due to continuous boring for several days. A new individual that enters an old bore hole is also a source of danger, as it works down from where the previous one left off and rapidly reaches the growing point. Sand, salt and marothi cake (*Hydnocarpus whittiani*) have all been tried for filling in the holes; though they are useful in checking the entry of fresh beetles, they are none of them reliable as a permanent protection.

Hirst (S.). **Descriptions of New Acari, mainly parasitic on Rodents.**—*Proc. Zool. Soc. London*, 1925, pt. 1, pp. 49–69, 15 figs. London, April 1925.

The mites described include *Paratetranychus biharensis*, sp. n., on rose leaves from Pusa.

Burkill (I. H.). **Annual Report of the Director of Gardens [Straits Settlements] for the Year 1924.**—6 pp. Singapore, 1925.

The Pyralid, *Sylepta derogata*, was the cause of disfigurement of *Hibiscus* bushes in Singapore in 1924, the foliage being rolled and eaten. A Melolonthid of the genus *Apogonia* causes continual trouble by eating the leaves of *Warszewiczia coccinea*. *Phenacoccus iceryoides*, a Coccid recently imported from southern India, has done a great deal of damage among extensive plantings of young rain-trees [*Pithecolobium saman*], the pruning of which ensures a continual supply of succulent shoots for the insects.

Gater (B. A. R.) & Yusope (M.). **A Note on *Laelia suffusa*, Wlk. (Lymantriidae) damaging Padi.**—*Malayan Agric. Jl.*, xiii, no. 3, pp. 72–76. Kuala Lumpur, March 1925.

The Lymantrid, *Laelia suffusa*, Wlk., has been the cause of several outbreaks on rice in the Malay Peninsula, where it does not seem to have been previously recorded. The moths are active only in the evening and at night. The oviposition period lasts about 4 days, eggs being laid in straight rows along the stem of the food-plant; the total

possible number of eggs produced by one female is apparently well over 260. Hatching occurs in 6 or 7 days, and two days later the larvae begin to feed. The larval stage lasts 25 to 37 days, and the pupal stage 8 to 13. These stages are described. No parasites have as yet been found. At present little more than hand-picking can be done on Malay small-holdings, but ordinary derris extract would be effective as a spray against the young larvae. In the laboratory the larvae feed indiscriminately on rice, maize and several grasses; it is possible therefore that the wild grasses surrounding the rice fields harbour the moth, and they should be cleared away as much as possible, especially during the time when there is no rice on the land and during planting out.

FULMEK (L.). **Techniek der bladluizenbestrijding met Akar toeba.** [The Technique of Spraying with Derris against Aphids.]—*Deli Proefst.*, Vlugschr. 33, 4 pp., 3 figs. Medan, March 1925.

A spray containing 1 lb. derris, 10 gals. water and 5 oz. soft soap is effective against Aphids infesting tobacco in Sumatra. The derris roots, which may be dry or fresh, are cut into small pieces, placed in a little water and then pounded into a paste, which is diluted with a gallon of water and left standing overnight in a wooden vat; an iron container must not be used. The dregs are then pressed, and all the fluid is strained through a cotton cloth. The resultant concentrate is a milk-white solution, which keeps for a few days only. It is diluted with 9 parts water for spraying. About 16 gals. of solution are needed for 1,000 tobacco plants that have been 25–30 days in the field. Twice this quantity is needed for full-grown plants. If derris roots are to be stored, they must be kept dry.

KARNY (H. H.). **Die an Tabak auf Java und Sumatra angetroffenen Blasenfüsser (Thysanoptera).** [The Thysanoptera found on Tobacco in Java and Sumatra.]—*Bull. Deli Proefst.*, no. 23, 55 pp., 20 figs. Medan, 1925.

Descriptions, with a key, are given of *Heliothrips haemorrhoidalis*, Bch., *Frankliniella tabacicola*, sp. n., *Isoneurothrips jenseni*, sp. n., *Thrips palmi*, sp. n., *T. holorphnus*, sp. n., *T. japonicus*, Bagn., *Fulmekiola interrupta*, gen. et sp. n., *F. continua*, sp. n., *Anaphothrips flavicinctus*, Karny, *A. andreae*, sp. n., *A. sumatrensis*, sp. n., *A.* (?) *plynopygus*, sp. n., *Megalurothrips setipennis*, sp. n., *Thryphactothrips mediosignatus*, sp. n., *Ecacanthothrips sanguineus*, Bagn., *Phloeothrips subglaber*, sp. n., *Empresmothrips pallipes*, sp. n., *Haplothrips ceylonicus*, Schmutz, *Chelaeothrips exunguis*, sp. n., *Androthrips collaris*, sp. n., *Gynaikothrips fulmeki*, sp. n., and *Ophidothrips medioflavus*, sp. n.

VAN HEURN (W. C.). **De aardappelknollenrups.** [The Potato Tuber Caterpillar.]—*Inst. Plantenziekten*, Bull. 20, 10 pp., 3 figs. Buitenzorg, 1925.

Owing to the occurrence of the potato tuber moth, *Phthorimaea operculella*, on field and stored potatoes in Java, attention is drawn to the need for checking its spread. The usual remedial measures are advised, carbon bisulphide being recommended for fumigation in storage.

DUPORT (L.). **Rapport sur quelques-unes des recherches poursuivies à la Station entomologique de Cho-Ganh pendant l'annee 1924.**— *Sta. ent. Cho-Ganh,* Bull. périodique no. 22, 7 pp. Hanoi, 1925.

The rearing of the parasites of *Xylotrechus quadripes,* Chevr. (coffee borer) has continued during the year [*cf. R.A.E.,* A, xii, 463]. By rearing *Chlorophorus annularis,* Fairm., on dry bamboo it has been found possible to secure continuous breeding throughout the period from April to December, and thus to obtain a constant supply of larvae for *Dorycles strioliger,* Kieff., and *Sclerodermus domesticus,* Kieff.

Other pests troublesome during the year were *Schoenobius incertellus;* Wlk. (rice stem borer), which, together with certain Rhynchota attacking the young grains, was responsible for the greatest damage to the rice crop. Leaf-eating caterpillars and Coleopterous larvae living in the soil have also done considerable damage, but have not yet been identified. A study is being made of measures for the control of *S. incertellus.* The removal and destruction of the infested stems soon after flowering would give good results, but the stubble remaining on the ground must also be destroyed, or cut down to ground level as the crop is gathered. The mature larvae and pupae remain at the base of the stubble, and the higher this is left, the more readily it will send out fresh shoots, which, as soon as they are sufficiently grown, will be used for oviposition by the newly-emerging moths. Other pupae remain on the ground until the early-growing rice of the next crop is high enough for breeding. The damage done is sufficient to warrant remedial measures on a large scale, and local labour might be used for cultural operations with little expense and much benefit.

On cotton, the larva of a small species of *Pyroderces* has caused much damage by preventing development of the capsules, which fall off or dry up, half opened and blackened; in some places as much as three-fourths of the crop has been ruined by this moth. In other localities, *Earias fabia,* Stoll, is the cause of similar damage. *Dysdercus cingulatus,* F., sometimes causes serious staining of the lint soon after the capsules have opened. The only remedy for these three pests is the removal and destruction of the infested capsules.

CREVOST (C.). **Catalogue des produits de l'Indochine. Groupe iii.**— *Bull. écon. Indochine,* xxvi (1923), no. 163, pp. 515–545, figs. Hanoi-Haiphong, 1924. [Received 2nd May 1925.]

In the course of this treatise the chief insect pests of the coconut are briefly dealt with. *Oryctes rhinoceros,* L., is dangerous in the adult stage only, attacking the bases of the new shoots, from which it enters and tunnels towards the heart of the tree. The worst result of its attack is generally the attraction of *Rhynchophorus ferrugineus,* Oliv., to the wounds caused by it. Injections of 2 or 3 per cent. copper sulphate give good results. *O. rhinoceros* is generally found in the vicinity of houses, where it lives in heaps of manure or decomposing organic matter, which should therefore be removed from the neighbourhood of coconut plantations. The weevil, *R. ferrugineus,* is a more dangerous pest, as it is the larva that bores into the tree, and when several insects are at work on one palm, the leaves at the top turn yellow and the tree may die. The surest remedy is to fell and burn infested trees. In a footnote it is stated that a successful method with other palms (*Chamaerops*) was the injection of 5 cc. of carbon bisulphide followed by $1\frac{3}{4}$ pints of water.

Termites are often troublesome in nurseries or on newly planted trees, and may be repelled by scattering salt or lime around them. Locusts sometimes devour the young leaves.

HARUKAWA (C.). **Studies on the Bionomics of the Pear Fruit Saw-fly, *Hoplocampa minuta*, Christ.**—*Ber. Ōhara Inst. landw. Forschungen*, ii, no. 4, pp. 505–520, 1 pl. Kuraschiki, 1924. [Received 21st April 1925.]

A footnote to this paper states that Rohwer has since described the Japanese pear sawfly as a new species, *Hoplocampa pyricola* [*R.A.E.*, A, xii, 363], thus confirming the author's doubt as to its identity with the European plum sawfly, *H. minuta*, Christ (*fulvicornis*, F.). It is widely distributed in Japan and does considerable injury to the pear crop. The egg, larval and adult stages are described. There is one generation a year. In the southern part of the Okayama prefecture the adult appears about mid-April. The larval period is, roughly, 2-3 weeks near Kurashiki, with a feeding period of 15-20 days. In the orchard the larvae occur from about 23rd April; usually most of them are full-grown by 20th May. They make cocoons in the soil. The adult lives 10-19 days. Three captive females laid 32, 17 and 55 eggs. These sawflies are very sluggish in the morning and in cloudy weather. To oviposit, the adult cuts a small cavity in the tissues of the outside upper part of the calyx and inserts an egg. The cut is covered with a viscous fluid that dries and turns black, so that it is revealed by examination of the flower from the side of the peduncle. The spot becomes brownish in a few days. The larva has five instars. When newly-hatched, it feeds on the tissues that enclosed the egg, and then tunnels through those of the calyx or gnaws small, shallow depressions near the base of the anthers. In a few days it enters the fruit or in some cases leaves the fruit in which it hatched and bores into another near its calyx end. As the calyx is injured at its base, it withers and drops shortly after the petals have fallen, and since from 3 to 5 young fruits may be injured by one larva, great losses will ensue if this sawfly is abundant. The pear and sand-pear [*Pyrus sinensis*] are the food-plants of this pest, the early varieties suffering most. For capturing the adults Nodzu recommends that the trees should be shaken over a sheet of tin smeared with heavy oil. A considerable amount of oviposition can be prevented by doing this in the morning during the period of emergence. Paris green or lead arsenate either alone or combined with Bordeaux mixture are effective against the larvae, especially when they are migrating from fruit to fruit. The contact insecticides commonly used are preparations of pyrethrum and oil emulsions. Winter ploughing kills hibernating larvae. Adults may be captured or killed by spraying if a few early-flowering varieties are planted as trap-trees in an orchard where late-flowering varieties alone are cultivated. All wild pear trees should be destroyed.

SONAN (J.). **On Six Species of Ichneumonidae with known Hosts.**—*Formosan Agric. Rev.*, xix, no. 219, pp. 149–163. Taihoku, February 1925. (In Japanese.)

The following Formosan Ichneumonids are described:—*Zacharops narangae*, Cushman, parasitic on larvae of *Naranga aenescens*, Moore; *Henicospilus striatus*, Cameron, parasitic on larvae of *Notolophus*

(*Orgyia*) *posticus*, Wlk. ; *Ephialtes formosana*, Cushman, parasitic on larvae of *Metanastria punctata*, Wlk. ; *Echthromorpha notulatoria*, F., parasitic on pupae of *Clania* sp., *Stilpnotia cygna*, Moore, and *M. punctata* ; *Bassus laetatorius*, F., parasitic on larvae of *Syrphus serarius*, Wied., *S. corollae*, F., and *Ischiodon scutellaris*, F. ; and *Metopius rufus*, Cameron, parasitic on pupae of *Prodenia litura*, L.

LAING (F.). **Synonymy of some Aphididae.**—*Entomologist*, lviii, no. 744, p. 123. London, May 1925.

The following new synonymy is given :—*Anuraphis helichrysi*, Kalt. (*Aphis bartsiae*, Wlk.) ; *Hyalopterus arundinis*, F. (*Aphis gracilis*, Wlk.) ; *Aphis cardui*, L. (*lata*, Wlk.) ; *A. rumicis*, L. (*inducta*, Wlk., *suffragans*, Wlk., *translata*, Wlk.) ; *Myzus persicae*, Sulz. (*A. cynoglossi*, Wlk., *A. redundans*, Wlk., and the winged females of *A. aucta*, Wlk., the apterous females of the last-named being apparently a different species). *A. prunaria*, Wlk., on sloe (*Prunus spinosa*) is identical with *Rhopalosiphum nymphaeae*, L. ; this is apparently the earliest record of this species on *Prunus*.

THEOBALD (F. V.). **Aphides attacking Vegetables and Market-garden Crops.**—*Jl. Minist. Agric.*, xxxii, no. 2, pp. 154–164, 11 figs. London, May 1925.

This paper has already been noticed from another source [*R.A.E.*, A, xiii, 106].

MACDOUGALL (R. S.). **Insect and other Pests of 1923.**—*Trans. Highland & Agric. Soc., Scotland*, reprint, 42 pp., 38 figs. [Edinburgh] 1924. [Received 8th May 1925.]

The birch bark-beetle, *Scolytus* (*Eccoptogaster*) *ratzeburgi*, Jans., was recorded in Britain in 1854 and 1884, from Rannoch in Perthshire, but not again until the summer of 1893. In July 1923 the beetle was discovered at work on a dying, standing birch near Hawick. Examination of stems, felled in the previous autumn, revealed larvae and pupae and breeding beetles. The life-history is described. There is one annual generation, from June to June.

Various kinds of beans are attacked by *Bruchus rufimanus*, Boh., which is native to Britain. A slightly smaller, American species, *B. obtectus*, Say, also enters beans and can breed and multiply in stored beans if these have been previously infested or damaged in some way. The female of *B. rufimanus* oviposits on the young pods in the fields, entering the blossom for the purpose. The larvae bore into the developing beans, in which they pupate. This species does not, however, oviposit in the store on dried beans, and infested seed kept in a closed receptacle over the year will be safe for sowing, as the beetles will have emerged and be found dead. The best fumigants are carbon bisulphide, 5 lb. per 1,000 cu. ft. of air-space, and carbon tetrachloride, 10 lb. per 1,000 cu. ft., for 36–48 hours. The temperature is important, and should not be less than 60° F., 70°–75° F. being the optimum. Hydrocyanic acid gas is of great service when fumigation has to be done on a very large scale. Heat is not recommended against *B. rufimanus* in broad beans as the beetles are very resistant to it, and it has an injurious effect upon germination.

The bionomics and control of the cabbage root fly, *Phorbia* (*Chortophila*) *brassicae*, Bch., are briefly discussed. Where transplants are

being set out, the first application of mercury bichloride should take place on the fourth day after transplanting, with two further ones at intervals of a week. The onion fly, *Hylemyia antiqua*, Meig., is described, and the life-history briefly recorded [*R.A.E.*, A, xi, 67–69, 71]. The larvae are full grown in 3 weeks, and pupation takes place in the soil beside the attacked bulb and, more rarely, in the bulb itself. A poison-bait to attract the flies before the period of oviposition is recommended, consisting of sodium arsenite $\frac{1}{4}$–$\frac{1}{2}$ oz., cheap molasses 1 pint, water 1 gal. The best materials for use as deterrents are discussed [*R.A.E.*, A, x, 50].

The wheat bulb fly, *Hylemyia coarctata*, Fall., did less damage in 1923 than in previous years. The conditions under which it proves harmful are discussed and the life-history described [*R.A.E.*, A, ix, 321]. Oats are immune from attack, and barley is usually not ready till the maggot has completed its feeding, though larvae have been found in winter barley after bare fallow in Suffolk, in rye after silage crops, and in couch grass, *Agropyrum repens*. Control of an outbreak can only be effected by cultural methods. Changes in the order of cropping should be based on the assumption that wheat following grass or another cereal will escape damage, whereas the worst attacks occur after potatoes and bare fallow.

Bibionid larvae that have been found at the roots of grasses are *Bibio marci*, L., *B. johannis*, L., and *Dilophus febrilis*, L. These flies lay their eggs in the soil and in decaying organic matter, especially fresh dung.

Gahan (C. J.). **Furniture Beetles.** —*Brit. Mus. (Nat. Hist.)*, Econ. Ser. no. 11, 24 pp., 1 pl., 7 figs. London, 1925. Price 6*d*.

This new edition of a paper that has already been noticed [*R.A.E.*, A, viii, 443] contains two additional figures.

Malenotti (E.). **Il "Tallone di Achille" degli animali dannosi in agricoltura.** [The Vulnerable Points of Insects injurious to Agriculture.]—*Minist. Econ. Naz., R. Osservatorio fitopatol. Verona*, 13 pp., 4 figs. Verona, 1925.

This article describes in a popular manner the methods by which various insect pests of agriculture in Italy may be successfully combated.

Del Guercio (G.). **Nuova contribuzione allo studio della Schizoneora del melo e del suo nemico endofago** *Aphelinus mali* **Hald. var.** *italica* **Del Guercio.** [A New Contribution to the Study of the *Eriosoma* of the Apple and of its Endophagous Enemy *A. mali* var. *italica*.]—*Istituto agric. colon ital.*, 36 pp., 2 figs., 3 pls. Florence, 1925.

The woolly apple aphis, *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm., is described from material collected in Italy, where it is a great pest of apples. In June both apterous and winged parthenogenetic females occur. In September winged sexuparae appear from the masses covering the trunks of ordinary apple trees, and these continue throughout October in Central and North Italy, and also in November in South Italy. In Tuscany pale-coloured larvae are found in December and January on the roots of paradise stock, and in January pale-coloured

stem-mothers are found there, followed by yellow-brown stem-mothers that appear in March, and of which the apterous and winged females first mentioned are the descendants. In Italy development occurs on apple and pear, or on apple alone in the absence of the other trees. It is the occurrence of the winged parthenogenetic females in June that accounts for the rapid spread of the Aphid. The diffusion of the grape-vine *Phylloxera* is very slow by comparison owing to the absence of this winged colonising form. In the course of breeding experiments it was observed the apterous parthenogenetic females can produce progeny at the third moult without waiting for the fourth, but it is not certain whether this was not due to artificial conditions as it was not seen under natural ones. In general, the time of development diminishes from January to February and from February to March and April until the minimum is reached in July and August. There are 13 or 14 overlapping generations a year, of which about 7 occur in summer. The sexual forms are more active than the parthenogenetic ones. It has always been observed that the former have no waxy coating, but the author states that the females do possess this, though it is of a rudimentary character, and only appears in the last two moults. It was found experimentally that the Aphids on branches and roots are killed by submerging the material in water. While the waxy covering protects the Aphids against low temperatures, it is not an effective shield against heavy rain or storms of wind. Microbic infections are not effective.

Predatory enemies such as the Coccinellids, *Adalia bipunctata*, L., *Chilocorus bipustulatus*, L., and *Exochomus quadripustulatus*, L., are of little practical value, as their action is irregular. The Chalcid, *Aphelinus mali*, Hald., imported from Paraguay and Paris, has proved an effective parasite of *E. lanigerum* and destroys it, when near or in the adult stages, at all seasons of the year. In Italy the females of *A. mali* are represented by two forms, the smaller of which (*A. mali* var. *italica*, Del G.) appears before the other and travels further in search of its host. For this reason the second, larger form, which remains on the foliage, is apparently present in larger numbers. This observation seems new in the case of Chalcids. It is necessary that parasitised material should be placed on the most heavily infested trees in the middle of the apple orchard. Good results have not been obtained by placing it on isolated trees. In 40 days of swarming the parasite can cover about $\frac{1}{4}$ mile measured in a straight line. *A. mali* is also very resistant to lack of food and is very active. In the case of a fruit crop (apple) an infestation by *E. lanigerum* should be treated first with *A. mali* and spraying; later on the Chalcid alone will suffice. Should the action of the latter lag, spraying should be employed again, the object being not only to free the trees from infestation but to ensure the crop yield. As far back as 1890 the author observed that some varieties of apple are almost immune from attack. Such varieties should be planted, except where the market demands fruit from susceptible varieties.

FUSCHINI (C.). **Il moscherino suggiscorza dell'olivo.** [*Clinodiplosis oleisuga*, Targ.]—*Il Coltivatore*, lxxi, no. 10, pp. 312–313. Casale Monferrato, 10th April 1925.

Withering of the twigs of olive trees in Umbria is due to the larvae of *Clinodiplosis oleisuga*, Targ. This Cecidomyiid usually has two generations a year, one in spring and summer, and the other in autumn

and winter. All injured twigs should be removed and burnt. If the injury occurs on larger branches, the bark should be removed at the point of attack and burnt. The trees should be lime-washed, and all wounds tarred.

Brocher (F.). **L'appareil buccal des larves de *Psylla pyrisuga* Fstr. Etude anatomique et physiologique.**—*Ann. Soc. ent. France,* xciv, pt. 1, pp. 55–66, 12 figs. Paris, 1925.

This discussion of the mouth-parts of larvae of *Psylla pyrisuga* includes hitherto unrecorded observations that explain their function. Identical appearances were also noticed in other larvae, possibly of *P. pyricola* or more probably those of *P. pyri.*

Marié (P.). **La destruction des sauterelles migratrices considérée au point de vue international.**—*Bull. Soc. Agric. France,* lvii, no. 4, pp. 105–109, 1 fig. Paris, April 1925.

This information on the organisation of international measures against locusts is an extract from a paper by P. Vayssière [*R.A.E.*, A, xii, 556].

Poutiers (R.) & Genieys (P.). **Traitements d'hiver contre les cochenilles des orangers.**—*C. R. Acad. Agric. France,* xi, no. 14, pp. 460–465. Paris, April 1925.

As *Chrysomphalus dictyospermi* continues to increase on *Citrus* on the Mediterranean coast in spite of the presence of parasites, experiments with winter treatments have been made, using lime-sulphur sprays and oil emulsions. The usual lime-sulphur mixture, 21° Bé., diluted 8 : 100, gave only poor results and scorched the young foliage to some extent; commercial lime-sulphur, 35° Bé., diluted 7 : 100, proved an excellent summer treatment, but had little direct effect on the scales in winter. Several preparations of oil emulsion are described, the best of which is prepared as follows. A smooth paste is made of 5 lb. flour to about 2 gals. water, and this is added while hot to 10 lb. soft soap, beating the solution well with a stick or metal whisk. The solution is then emulsified with 50 to 100 lb. mineral oil (anthracene oil or common motor oil, density 0·910) according to the concentration required. The emulsion can be prepared several days before it is required for use, when it should be diluted to 100 gals., emulsifying vigorously all the time. The oil emulsions proved greatly superior to the lime-sulphur sprays for winter treatments, and the one described is particularly recommended on account of its cheapness and simplicity of preparation.

Gautier (C.). **Découverte de la forme hibernante, en France, de *Tingis pyri,* F. (Hem. Tingitidae).**—*Bull. Soc. ent. France,* 1925, no. 4, pp. 72–75. Paris, 1925.

It has generally been supposed that *Stephanitis* (*Tingis*) *pyri,* F., hibernates in the egg stage, the adult appearing in the spring and dying in the autumn, eggs being laid on the bark of pear trees. The author's observations show that this theory is erroneous. He has

found adults in December and in February clustering on the lower surface of strawberry leaves growing near pear trees that had lost all their leaves. It is obvious, therefore, that in France the insect winters in the adult stage. Oviposition occurs on the lower surface of the leaves of the food-plants. Whether the adults sometimes seek shelter on the ground or on other low-growing plants during winter is not yet known. In mid-April, the insects have been found on the leaves of black currant (*Ribes nigrum*), while those of pear and apple were still in the bud stage; probably the adults, which can fly well, leave the plants that have sheltered them through the winter for those on which they can breed. The winter measures that have been practised in the past against *S. pyri*, for the purpose of destroying the winter eggs on the trunks and branches of pear and apple, and the liming of walls supporting these fruit trees are therefore utterly useless.

SERGENT (Ed.) & ROUGEBIEF (H.). **Nouvelles expériences sur la dissémination des levures dans le vignoble par les Drosophiles.**—*C.R. hebdom. Acad. Sci.*, clxxx, no. 13, pp. 1078–1080. Paris, 1925.

Previous experiments [*R.A.E.*, A, xii, 559] showing that vine yeast is carried in vineyards by insects, especially flies of the genus *Drosophila*, are confirmed.

ROYER (M.). **Etude systématique sur** *Eurydema oleraceum* **(L.) [Hem. Pentatomidae] et ses variétés.**—*Bull. Soc. zool. France*, xlix, no. 2, pp. 117–136, 16 figs. Paris, 31st May 1924. [Received 24th April 1925.]

This paper includes a key to 24 named varieties of *Eurydema oleraceum*, L., their distribution, and the description of a new variety, *E. oleraceum linnei*, from Sweden.

GAUTIER (C.) & BONNAMOUR (S.). **Recherches sur** *Tetrastichus rapo*, **Walker (Hym. Chalcididae).**—*Rev. Path. vég. & Ent. agric.*, xi, no. 4, pp. 246–253. Paris, October-December 1924. [Received 20th April 1925.]

G. Martelli, in studying the biology of the Chalcid, *Tetrastichus rapo*, Wlk., has observed that the female attacks larvae of *Pieris brassicae*, L., measuring from 12 to 20 mm., piercing the skin of the larva and reaching to the skin of the larvae of *Apanteles glomeratus*, L., or of *Anilastus ebeninus*, Grav. (parasites of *P. brassicae*), in which it oviposits. In a similar manner, oviposition occurs on the larvae of *Apanteles rubecula*, Marsh., through the skin of its host larva (*P. rapae*, L.). F. Picard maintains that these parasites are only attacked when they have completely eaten out the body content of the host and are living within the dried skin. The authors' observations lead them to the conclusion that *T. rapo* is a true hyperparasite, attacking *Anilastus ebeninus* or *Apanteles glomeratus* while the primary host is still alive. The emergence of adults arising from one oviposition may occupy several days.

MARIÉ (P.). **Résultats destructifs obtenus sur les Scolytides propres aux Conifères, par la méthode des arbres pièges.**—*Rev. Path. vég. & Ent. agric.*, xi, no. 4, pp. 328–330. Paris, October-December 1924. [Received 20th April 1925.]

The author gives many instances of success obtained with the method of using certain trees as traps for Scolytids infesting conifers in forests [*R.A.E.*, A, x, 555]. Among the insects that were successfully controlled by this practice over a period of two years were *Myelophilus* (*Blastophagus*) *piniperda*, *Ips sexdentatus* and *Pissodes notatus* on Austrian pines [*Pinus laricio austriaca*]; *I. sexdentatus*, *I. laricis* and *I. bidentatus* on *Pinus sylvestris*; and *I. sexdentatus*, *I. autographus*, *I. typographus*, *I. cembrae*, etc., on mixed conifers, chiefly *Pinus sylvestris* and spruce. Trees in adjacent stands that were not treated remained badly infested. The cost was found to be largely covered by the sale of the trap trees, after removal and immediate burning of the infested bark.

WILLAUME (F.). **Etat actuel de la question du Pyrèthre-Insecticide.**—*Rev. Path. vég. & Ent. agric.*, xi, no. 4, pp. 321–327. Paris, October-December 1924. [Received 20th April 1925.]

The efforts made by certain agricultural bureaux to perfect and popularise the use of pyrethrum obtained from *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* as an insecticide are described. The advantage and economy of growing the plant and preparing the insecticide on the land on which it is to be used are especially urged, and the poor quality of some of the brands of pyrethrum powder offered on the market is discussed. Some 250 growers have already been supplied with seed of good quality grown at the National Horticultural School at Versailles, and more will be distributed to those applying for it.

WILLAUME (F.). **Culture et utilisation sur place du pyrèthre insecticide.**—*Bull. Soc. nat. Acclimat. France*, lxxii, no. 2, pp. 20–22. Paris, February 1925.

This information on pyrethrum as an insecticide has already been noticed [*R.A.E.*, A, xii, 106].

STAUDINGER (H.) & RUZICKA (L.). **Insektentödende Stoffe. I. Ueber Isolierung und Konstitution des wirksamen Teiles des dalmatinischen Insektenpulvers.** [Insect-killing Substances. I. The Isolation and Composition of the Active Component of Dalmatian Insect Powder.]—*Helvetica Chimica Acta*, vii, no. 2, pp. 177–201. Basle & Geneva, Georg & Co., 1924.

This is the first of a series of papers recording researches made from 1910 to 1916 on pyrethrum. The active principle in the flowers of *Chrysanthemum cinerariaefolium* has been extracted in the form of two esters, here called pyrethrine I and pyrethrine II. The former is a thick oil containing a monocarboxylic acid and an alcohol, pyrethrolon. Pyrethrine II is a thicker, slow-flowing material containing a dicarboxylic methyl ester acid and the same alcohol, pyrethrolon. Pyrethrine I is the more effective, a dilution of 1 in 10,000 requiring 10–20 minutes to kill cockroaches, *Blattella* (*Blatta*) *germanica*, L., whereas pyrethrine II takes twice the time. These substances are

the most powerful insect-poisons known, being approached only by nicotine, which, however, is a dangerous general poison, whereas the pyrethrines do not appear to affect warm-blooded animals. Lice, bugs, midges, bees and butterflies were affected in the same way as cockroaches. Dalmatian insect powder contains 0·3 per cent. of the active oils.

STAUDINGER (H.) & RUZICKA (L.). **Insektentötende Stoffe. II—X.** [Insect-killing Substances. II—X.]—*Helvetica Chimica Acta*, vii, nos. 2–3, pp. 201–259, 377–458. Basle & Geneva, Georg & Co., 1924.

These papers are complementary to the one abstracted above and deal solely with purely chemical investigations.

MANEGOLD (O.). **Maden von** *Piophila casei* **Linné in zubereitetem Fleisch.** [Maggots of *P. casei* in prepared Meat.]—*Zeitschr. Fleisch- u. Milchhygiene*, xxxv, pp. 102–104, 1 fig. (Abstract in *Deutsche tierärztl. Wochenschr.*, xxxiii, no. 14, p. 225. Hanover, 4th April 1925.)

A shipment of American bacon was found to be infested with the larvae of *Piophila casei*, L. They occurred in nests of 50–80 individuals, and there were also some pupae. Whereas the development of these larvae suffers in pure fat and in soap, smoked ham or bacon are favourable media.

PRELL (H.). **Das Rätsel des Eichentriebschnittes.** *Camponotus herculeanus* **L. als Eichenfeind.** [The Riddle of the Cutting of Oak Shoots. *C. herculeanus* as a Pest of Oaks.]—*Tharandter Forstl. Jahrb.*, lxxvi, no. 2, pp. 49–62, 2 pls. Berlin, 1925.

The fact that the ant, *Camponotus herculeanus*, L., is responsible for injury to the May shoots of oak has already been noticed from another paper [*R.A.E.*, A, xiii, 208].

HILGENDORFF (G.). **Ueber die für die Bekämpfung des Koloradokäfers zur Verfügung stehenden Teeröle.** [On the Tar Oils available against the Colorado Beetle.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 4, pp. 26–29. Berlin, 1st April 1925.

For combating the Colorado potato beetle [*Leptinotarsa decemlineata*] certain tar-oils have been found to have the requisite qualities [*R.A.E.*, A, xii, 438], but a month's output of these in Germany produces only enough for treating about 30 acres. Less than 7 pints per square yard has been found to be ineffective. Nor is the emulsification of these oils with water satisfactory. Tests of other tar-oils showed them to be ineffective. A series of tests with the larvae of *Oryctes nasicornis* showed that the speed of penetration in the soil is of importance as well as the range downwards. At the rate of about a gallon to rather more than a square yard these oils had sufficient speed to prevent the escape of larvae, and if only about 1½ pints were used

they succeeded in reaching a depth of 16 inches and more in 4 hours. The larger amount injured the larvae at depths between 4 and 16 inches sufficiently to prevent their escape.

KIRCHNER (O.). **Lysol als Spritzmittel.** [Lysol as a Spray Insecticide.] —*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 4, p. 31. Berlin, 1st April 1925.

Referring to unsatisfactory results with lysol against *Lygus pratensis* on potatoes [*R.A.E.*, A, xiii, 148], it is pointed out that in the case of cabbage this bug and *Eurydema oleraceum* have been successfully combated in Scandinavia with a solution of 4 per cent. strength. The ground must be soaked and the roots reached. The withering of leaves on which the solution has rested for a long time is of far less consequence than the injury done by the bugs.

SACHTLEBEN (—). **Starkes Auftreten forstschädlicher Insekten.** [An Outbreak of Insects injurious to Forests.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 4, pp. 31–32. Berlin, 1st April 1925.

The pine shoot moth, *Rhyacionia* (*Evetria*) *buoliana*, Schiff., has recently occurred in large numbers in the pine forest at Heidelberg. *Bupalus piniarius*, L., has infested very heavily the Pfälzerwald in the Rhine Palatinate, and a pine beetle, *Myelophilus* sp., has also appeared there in numbers owing to delay in removing unbarked fire-wood from the extensive areas cleared in 1924.

SCHWARTZ (—). **Wie steht es mit der Ausbreitung des Kartoffelkäfers (Koloradokäfers, *Leptinotarsa decemlineata*) in Frankreich ?** [What is the Position as regards the Spread of *L. decemlineata* in France ?] —*Anz. Schädlingskunde*, i, no. 4, pp. 37–39, 1 map. Berlin, April 1925.

Referring to an article under the above title [*R.A.E.*, A, xiii, 148] it is pointed out that all the official measures taken in Germany are purely administrative and aim at having ready a fully matured plan that can be applied immediately the occurrence of *Leptinotarsa decemlineata* is observed in any part of Germany. All details from the watching of the fields to the compensation of the owners have been worked out.

VON VIETINGHOFF-RIESCH (—). **Eine offene Frage in der Biologie der Kieferneule.** [An open Question in the Biology of the Pine Moth.]—*Anz. Schädlingskunde*, i, no. 4, pp. 40–42. Berlin, April 1925.

It is doubtful whether the pine-moth [*Panolis flammea*] prefers pines of certain ages or whether it infests all pines indiscriminately. In this connection the author discriminates between infestations that develop locally and those due to immigration. The former usually break out in young plantations, probably because the soil conditions are suitable for pupation. For this purpose the caterpillar avoids extremes of drought or moisture and selects sites where the ground covering of litter can be easily penetrated.

In cases of infestation by immigration due to swarming of the adults or migration of the caterpillars, oviposition is likely to occur on all the older trees, and a general attack results.

FRIEDERICHS (K.). **Spinnfüssler (Embiiden) als Orchideenschädlinge.** [Embiids as Pests of Orchids.]—*Anz. Schädlingskunde*, i, no. 4, pp. 43–44, 1 fig. Berlin, April 1925.

Injury to the roots of orchids by Embiids was first recorded in 1876 from London, where a species, subsequently named *Oligotoma michaeli*, MacLachlan, attacked plants in a greenhouse. In 1896 Urich in Trinidad observed *Antipaluria urichi*, Sauss., and *O. trinitatis*, Sauss., to be harmful in the same way. The author has observed very severe injury to *Phalaenopsis amabilis* in Java, the orchid failing to flower owing to feeding by *O. vosseleri*, Krauss, and *O. saundersi*, Westw. No remedies are known, but painting the stems with a 5 per cent. solution of carbolineum may be useful.

FAES (H.) & STAEHELIN (M.). **La lutte contre les vers de la vigne (Cochylis et Eudémis) de 1922 à 1924.**—*Ann. agric. Suisse*, xxvi, pt. 1, pp. 131–154, 10 figs. Bern, 1925.

Polychrosis (*Eudemis*) *botrana*, Schiff., is increasing rapidly in many vineyards of French Switzerland where a few years ago it was unknown. Three generations in a year of this pest and two of the other important vine moth, *Clysia ambiguella*, Hb., overlap each other, thus greatly complicating the problem of control. A study has been made of the life-history and seasonal appearance of these moths and of the chief remedies used against them, and a detailed account is given of many experiments carried out on a large scale during 1922-24. The insecticides used were: Pyrethrum-soap solution, using 9 parts of soap-pyrethrum to 90 of water; a copper sulphate spray, with the addition of 10 lb. nicotine (15 per cent.) or 15 lb. tobacco decoction (8 per cent. nicotine) per 100 gals. of spray; an arsenical copper sulphate spray, in which 3 lb. Paris green or 10 lb. lead arsenate is added to 100 gals. of spray; 2 parts lime to 1 part of pyrethrum powder; and 95 per cent. of lime with 5 per cent. of calcium carbide.

The value of pyrethrum-soap solution against the young larvae of the first generation of *C. ambiguella* and the first and second generations of *P. botrana* has been confirmed. The results obtained by the dust mixtures were poor, probably owing to the heavy rains of 1924, and perhaps owing also to lateness in application; experiments with them will be continued. Against the second and third generations of *P. botrana*, pyrethrum and nicotine treatments were found to be best; dust gave poor results, though the lime and calcium carbide seemed more promising than the lime and pyrethrum. The copper sulphate spray with nicotine can also be used after the main flight of the moths, against all generations of both moths. The arsenical copper sulphate spray can be used against the larvae of the first generation of both species, but 15 days at the latest after blossoming all arsenical treatment should be stopped and the copper sulphate spray with nicotine substituted as soon as the main flight is over. The authors are of opinion that winter measures against these moths are

too expensive to be worth while; even if they succeeded in killing the majority of the hibernating pupae, under favourable conditions for development, the numbers would soon increase to normal again.

The efficiency of different brands of pyrethrum-soap was found to vary a good deal, and even that of the same brand varied from one time to another. Powder made from flowers of the second crop was quite effective. The experiments showed that the stalks of pyrethrum contain active insecticidal principles, and should be used. Good results were obtained whether the powder was made from flowers only, from the stalks only, or from the whole plant as gathered by the scythe and chopped in a chaff-cutter. The usual process is to mix the extract from 1 part by weight of flowers or stalks with 6 parts of concentrated soap solution. By increasing the quantity of stalks used for extraction to 2 or even 3 parts to 6 parts of soap solution the insecticidal value was no greater. Alcohol used to be the only medium for extraction, but recently a number of other media have been tried, remarkable results being obtained in particular with petroleum ether. The further addition of a certain quantity of alcohol or soft soap did not increase the insecticidal power. It has generally been thought that the flower buds of *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* are stronger in insecticidal properties than the full-blown flowers (and they are generally more expensive in consequence), but the present experiments indicate that the contrary is the case; moreover, as the flowering period progresses the active principles increase in both flowers and stalks. It seemed also that, at least in alcoholic extracts, the quantity of alcohol used in treating the pyrethrum powder may also influence the insecticidal substances; the greater the quantity of alcohol used, the less power there was in the pyrethrum-soap solution. Attempts have been made to combine pyrethrum-soap solution with Bordeaux or Burgundy sprays used against mildew, but this is not recommended, as the insecticidal value of the pyrethrum-soap is distinctly lessened. The importance of increasing the cultivation of pyrethrum is again pointed out.

Protokoll der Konferenz zur Besprechung der Bedeutung und Anwendung von Arsen- und Bleigiften gegen Obst- und Weinbauschädlinge. [Minutes of a Meeting for the Discussion of the Importance and Use of Arsenic and Lead Poisons against Fruit and Vine Pests.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxiv, no. 8, pp. 137–150. Frauenfeld, 18th April 1925.

A resolution was passed by this conference, held in April 1925, requesting the Swiss Government to examine the question of permitting the use of markedly poisonous materials, especially arsenicals, against pests of plants, and if possible to draw up regulations of a uniform character governing their use. An advisory committee of agriculturists, medical men, chemists and entomologists is suggested.

Maag (R.). **Sommerspritzung der Obstbäume zur Bekämpfung von Schorf und Obstmade.** [Summer Spraying of Fruit Trees against Scab and Fruit Maggot.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxiv, no. 8, pp. 152–156. Frauenfeld, 18th April 1925.

At present lead arsenate for spraying can be used in Switzerland only experimentally and under special supervision. To make it better known there these reports of results obtained in 1922 and 1924 are

published. A mixture of 2 per cent. lead arsenate solution and 1 per cent. Bordeaux mixture was used in summer, and a great reduction of attack by scab and *Cydia pomonella* was attained at a cost that was only a fraction of the crop value saved.

FAHRINGER (J.). **Beiträge zur Hymenopterenfauna Dalmatiens, Montenegros und Albaniens.** [Contributions to the Hymenopterous Fauna of Dalmatia, Montenegro and Albania.] **III. Teil: Braconidae, Aphidiidae und Serphidae.**—*Ann. Nathist. Mus. Wien*, xxxviii, pp. 98–106. Vienna, 1925.

This is an extensive list of species, the distribution of which in other European countries is also given.

BLATTNÝ (C.). **Wightská nemoc včel čili acarinosa a roztoči v úle žijící.** [Acarine Disease of Bees and the Mites found in the Hive.] —*Včelařske Revue*, separate 12 pp., 7 figs. Prague, 1924. [With Summary in English.] [Received 25th April 1925.]

An account is given of the disease of bees produced by *Acarapis woodi*, Rennie, and of the habits of other mites infesting beehives.

VIELWERTH (V.). **Lalokonosec libečkovy.** [*Otiorrhynchus ligustici*, **L.**]—*Ochrana Rostlin*, v, no. 1, pp. 5–6, 2 figs. Prague, March 1924. [Received 20th April 1925.]

Extensive injury to lucerne during the past few years in Czecho-Slovakia has been found to be due to the feeding of the larvae of *Otiorrhynchus ligustici*, L., on the roots of the plants. The adults appear about May and migrate from the lucerne to adjoining turnip fields; they also attack grape-vines and fruit-trees, of which they damage the small buds. About the end of May they return to the lucerne field and lay their eggs on the stems of the plants near the ground. The eggs hatch about the middle of June. Remedial measures include hand collection of adults, which cannot fly, and surrounding infested fields by a trench with smooth sides about 1 ft. deep and of the same width.

BLATTNÝ (C.). **Entomologické poznámky.** [Entomological Notes.]—*Ochrana Rostlin*, v, no. 1, pp. 9–10. Prague, March 1924. [Received 20th April 1925.]

Tetranychus telarius, L. (*althaeae*, Hanst.) occurred in large numbers on *Althaea officinalis* and *Hibiscus officinalis* in Czecho-Slovakia; *T. tiliarius*, Herm., is an annual pest of limes. *Byturus tomentosus*, F., one of the more important pests of raspberries, is increasing in numbers. *Hister fimetarius*, Hbst., is recorded as predacious on *Phytometra* (*Plusia*) *gamma*, L. Other pests are *Gryllotalpa gryllotalpa*, L. (*vulgaris*, Latr.), *Hylastes palliatus*, Gyll., *Ephestia kühniella*, L., and *E. elutella*, Hb.

BLATTNÝ (C.) & BALAČEK (B.). **Živočišni škůdci chmele a pokusy s jich hubenim.** [Hop Pests and their Control.]—*Pokusnické zprávy českého odboru rady zemědělské v Praze*, 1924, no. 3, 16 pp., 25 figs. Prague, 1924. [Received 25th April 1925.]

The most important hop pests in Czecho-Slovakia are *Phorodon humuli*, Schr., and *Tetranychus telarius*, L.; others are *Agromyza* sp.,

Vanessa io, L., *Phytometra* (*Plusia*) *gamma*, L., *Acronycta rumicis*, L., *Anisoplia agricola*, F., *Empoasca* (*Chlorita*) *flavescens*, F., and *Smynthurus luteus*, Lubb. The natural enemies of Tetranychid mites include *Scymnus punctillum*, Weise, *Thrips flava*, Schr., and *Oligota* spp.

RAMBOUSEK (F.). **Schädiger und Krankheiten der Rübe 1923.** [Pests and Diseases of Sugar-beet in 1923.]—*Prager Zuckermarkt*, xlvii, pp. 154–419, 1923; xlviii, p. 300 et sqq., 1924.

RAMBOUSEK (F.). **Bericht über eine Inspektionsreise in die Slovakei.** [Report on a Tour of Inspection in Slovakia.]—*Idem*, xlvii, 1923, p. 561. (Abstracts in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 1–2, pp. 27–29. Stuttgart, 1925.)

Notes are given on various pests of sugar-beet in Czecho-Slovakia. Beetles, including *Opatrum sabulosum*, *Dorcadion pedestre* and *Silpha* sp., can be trapped in holes 6 inches deep. *Bothynoderes punctiventris* occurred in very large numbers; and, probably as the result of a sequence of beet crops, *Atomaria linearis* appeared in May 1923 in larger numbers than during the past 20 years. Infested areas should be sprayed with a 1 per cent. solution of potassium or sodium cyanide. *Zabrus tenebrioides* (*gibbus*) was very harmful in many localities. The only flea-beetle of importance is *Chaetocnema concinna*, which did considerable harm in high-lying districts.

Pegomyia hyoscyami (*betae*) often oviposits as early as May. If the beet grows quickly, the damage done by this fly is small. The larvae of *Bibio marci* and *B. hortulanus* live underground and attack beet in the same manner as wireworms. In Bulgaria heavy injury due to night feeding by the caterpillars of *Laphygma exigua* was observed.

VASILEV (E. M.). **Zuckerrübenschädlinge in Turkestan und im Kubangebiet.** [Sugar-beet Pests in Turkestan and in the Kuban Region.]—*Zeitschr. Zuckerind. cechosl. Rep.*, xlvii, p. 32, 1922–23. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 1–2, p. 29. Stuttgart, 1925.)

In Turkestan the larvae of *Phlyctaenodes nudalis*, Hb., injure the young leaves of sugar-beet. Other Lepidopterous pests are *Laphygma* (*Caradrina*) *exigua*, Hb., and *Heliothis* (*Chloridea*) *obsoleta*, F. (*armigera*, Hb.). The locust, *Dociostaurus* (*Stauronotus*) *maroccanus*, Thb., and Elaterid larvae also attack beet.

In the Kuban region there occur *Lixus ascanii*, L., *Adelphocoris lineolatus*, Gze., *Cassida nebulosa*, L., *Bothynoderes punctiventris*, Germ., and *Podonta nigrita*, F. The last-named beetle migrates to seed-beet after feeding on the flowers and young grains of wheat.

SPEYER (W.). **Ueber die Blutlausanfälligkeit von Apfelsorten.** [On the Susceptibility of various Varieties of Apple to Infestation by the Woolly Aphis.]—*Angew. Botanik*, vi, 1924, pp. 168–171. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 1–2, p. 77. Stuttgart, 1925.)

The contents of this paper are substantially the same as those of one already noticed [*R.A.E.*, A, xi, 243], the author considering that the problem of controlling *Eriosoma lanigerum*, Hausm., will ultimately resolve itself into a selection of apple varieties resistant to this Aphid.

THIEM (H.). **Blutlaus auf Birne.** [The Woolly Aphis on the Pear.]—*Angew. Botanik*, vi, 1924, pp. 179–191, 1 fig. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 1–2, p. 77. Stuttgart, 1925.)

The susceptibility of pears to *Eriosoma* (*Schizoneura*) *lanuginosum*, Htg., is not dependent on soil, position or method of cultivation, but is partly influenced by the stock, wild pear favouring infestation and quince hindering it. A sudden decrease of Aphid attack in summer is observable on pear. On *Crataegus* are found *Eriosoma* (*S.*) *lanigerum*, Hsm., and *Prociphilus crataegi*, Tullgr., the latter only occurring up to early July, as it migrates to other plants later in the year.

RAMMER (W.). **Schlupfwespen als Pflanzenschädlinge.** [Hymenoptera as Pests of Plants.]—*Natur*, xv, 1923–24, pp. 409–410. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 1–2, pp. 87–88. Stuttgart, 1925.)

In South and Central Russia *Harmolita* (*Isosoma*) spp. injure cereals to a less extent than *H. tritici* in America, but the losses are nevertheless considerable owing to the abundance of these Chalcids. *H. rossicum* is the most dangerous, as the larvae produce galls in the stems of wheat and rye. Those of *H. inquilinum* live in the galls of the preceding species. They are carnivorous during the first 2–3 days, and feed on the larvae of *H. rossicum*, but later on they feed on the plants. *H. eremitum* has two larval forms, but the adults are identical.

PRIN[T]Z (J. [Ya. I.]). **Beiträge zur Biologie und Bekämpfung der Rebschädlinge und zur künstlichen Befruchtung der Reben.** [Contributions to the Biology and Control of Vine Pests and to the Artificial Fertilisation of the Vine.]—*Winzerverband "Konkordia,"* 119 pp., 6 diagrams, 14 figs. Tiflis, 1925.

This is the German edition of a paper already noticed from the Russian [*R.A.E.*, A, xiii, 216].

[ZVEREZOMB-ZUBOVSKI (E. V.).] **Зверезомб-Зубовский (Е. В.). Определитель главнейших насекомых встречающихся в зерне и зерновых продуктах.** [Key to the Chief Insects found in Grain and its Products.]—**"Новая Деревня"** ["*New Village*"], 56 pp., 90 figs. Leningrad, 1925.

This is an amplified and revised edition of a key already noticed [*R.A.E.*, A, xi, 307].

[SPESIVTZEV (P. N.).] **Спесивцев (П. Н.). Определитель короедов.** [Key to Bark-beetles.]—**"Новая Деревня"** ["*New Village*"], 87 pp., 152 figs. Moscow, 1925.

This key covers the Scolytids occurring in Russia and also those attacking conifers in the Crimea, the Caucasus and Siberia, with notes on their distribution elsewhere. The characters used for the determination of the genera and species do not necessitate the use of a microscope or any special preparation of the insect.

(K2696) Wt P7/D23 1,500 7/25 H & Sp Gp 52

[Troitzki (N. N.).]. **Троицкий (Н. Н.). Предварительные результаты исследований экспериментальной станции по прикладной энтомологии краткий отчет за 1923 и 1924 г. г.** [Preliminary Results of Investigations of the Experiment Station of the Bureau of Applied Entomology for 1923-1924.]—**Госуд. Инст. Опытн. Агрон.** [*Govt. Inst. Expt. Agron.*], 58 pp., 1 pl. Leningrad, 1925.

During the years under review a detailed study was made of some of the more common insect pests, which are discussed at length. *Phorbia* (*Hylemyia*) *brassicae*, Bch., causes considerable injury to the roots of cabbage, particularly young seedlings, whereas the older plants are injured in similar manner by *P.* (*H.*) *floralis*, Fall. The latter has one generation a year and also causes considerable injury to seedling radishes. *P. brassicae* has a partial second generation. One of the chief factors controlling these flies is the destruction of the overwintering pupae by the fungus, *Penicillium*, and to a less extent by a Staphylinid beetle, *Aleochara* sp. The pupal diapause in hibernation may extend to 400 days.

It is essential for the females of *Anthonomus pomorum*, L., to feed in the spring before they are able to lay their eggs; and oviposition may be repeated in the following spring after a second hibernation.

The effect of injury by *Oscinella frit*, L., on different varieties of a number of grain crops is discussed at length.

[Pospelov (V. P.).] **Поспелов (В. П.). Об'единение исследований по вредителям растений в России.** [The Co-ordination, in Russia, of Observations on Plant Pests.]—**Извест. Госуд. Институт. Опытн. Агрон.** [*Bull. Govt. Inst. Expt. Agron.*], ii, no. 4–5, separate 5 pp. Leningrad, 1924. [Received 14th April 1925.]

The working of different types of central Bureaux of Applied Entomology in the British Empire, the United States of America, and Germany, is briefly reviewed with reference to the application of similar methods in Russia.

[Troitzki (N. N.).] **Троицкий (Н. Н.). Размножение вредных насекомых как один из факторов недорода 1924 года.** [The Increase of Injurious Insects as one of the Factors causing the Failure of Crops in 1924.]—**Извест. Госуд. Институт. Опытн. Агрон.** [*Bull. Govt. Inst. Expt. Agron.*], ii, no. 4–5, separate 7 pp. Leningrad, 1924. [Received 21st April 1925.]

One of the chief reasons of the failure of crops in the south of Russia during 1924 was excessive drought. The resistance of plants to unusual arid conditions is greatly lowered as a result of attack by various insect pests such as the Hessian fly [*Mayetiola destructor*, Say], the frit fly [*Oscinella frit*, L.], *Chaetocnema* sp., *Hylemyia* (*Leptohylemyia*) *coarctata*, L., *Chlorops taeniopus*, Mg., and *Phorbia* (*Adia*) *genitalis*, Schnabl. The reaction produced in the plants is discussed. The correct choice of dates for planting and the use of more resistant varieties are the obvious remedial measures to be adopted. The determination of the best time for sowing will require careful study and widespread application to be of any practical value.

[Sakharov (N.) & Megalov (A.).] **Сахаров (Н.) И Мегалов (А.). К дезинсекции элеваторов.** [On the Disinfection of Grain Elevators.]—**Станц. Защиты Раст. от Вредит. С.Х. Саратовск. Губернск. Земельн. Управ.** [*Sta. Plant Protect. Saratov Govt. Rural Dept.*], 26 pp., 1 fig. Volsk, 1925.

Though carbon bisulphide is repeatedly recommended for the fumigation of grain stores, it has apparently not been tested on a very large scale. The experiments here described were made in large grain elevators in the Saratov Government, infested with *Tyroglyphus farinae, Atropos pulsatoria, Tenebrio molitor, Calandra granaria, Laemophloeus testaceus* and *Ptinus fur*. Some of these insects were introduced for the purpose of the experiments. The carbon bisulphide was used at the rate of about 1 oz. per 14 cu. ft. of space for a period of 48 hours. All insects exposed to the gas were killed, but those protected in the depth of the grain or under dust, etc., were still alive. The facts that atmospheric conditions were not favourable at the time the tests could be made, and that they could not be prolonged for 72 or 96 hours in order to counteract the adverse conditions, are considered sufficient explanation of the indifferent results obtained. The penetration of the gas is slower at low temperatures. The great danger of fire is a serious disadvantage in the use of carbon bisulphide on such a large scale. The cubical content of the elevator was about 597,000 cu. ft. for which 1 ton 4 cwt. 12 lb. of carbon bisulphide was used.

Two experiments were also made with chlorine liberated from war pattern cylinders. In order to obtain a concentration of 5 parts of chlorine to 1,000 parts per volume of air, about 226 lb. of chlorine were used. The elevator was opened and ventilated after 15 hours. In the first experiment all insects were found dead, but some time later reinfestation occurred, either as a result of the introduction of infested grain or possibly because the gas did not kill the eggs of the insects. The second experiment was less successful, as many insects survived, this disparity apparently being due to a difference in atmospheric conditions. Chlorine gas requires a certain amount of moisture in the atmosphere to retain it in suspension ; under dry conditions it disperses too quickly. Further research is needed to determine the optimum conditions under which the gas may be used. The actual cost of fumigating with chlorine, including labour, is roughly half that of carbon bisulphide.

[Printz (Ya. I.).] **Принц (Я. И.). Матеріалы къ біологіи хлопковаго (коробочнаго) червя** (*Heliothis armigera* **Hübn.**) **и мѣры борьбы съ нимъ.** [The Biology of *Heliothis obsoleta*, F., and its Control.]—**Зап. Научно-прикл. отд. Тифл. Бот. Сада.** [*Notes App. Sci. Dept. Tiflis Bot. Gdns.*], pt. 2, separate 54 pp., 2 pls. Tiflis, January 1921. (With a Summary in German.) [Received 21st April 1925.]

Heliothis obsoleta, F. (*armigera*, Hb.) caused extensive injury to cotton in Transcaucasia during 1906–17. A detailed account of its various stages, life-history and habits is given. Two generations of the moth occur in the year. Trap crops are considered the most satisfactory remedial measure, maize being recommended for this purpose. A short account is also given of *H. peltigera*, Schiff., which has been considered a pest of cotton, though the author has never taken it on that plant. The observations on it described were made on henbane [*Hyoscyamus niger*] and *Atropa belladonna*.

[Uvarov (B. P.).] **Уваров (Б. П.). Борьба с вредителями хлопчатника при помощи аэропланов.** [Control of Cotton Pests by Means of Aeroplanes.]—**Хлопковое Дело** [*Cotton Industry*], iv, no. 1–2, pp. 67–72. Moscow, January-February 1925.

The recent advances in the United States of America in the destruction of insect pests by means of aeroplanes are reviewed, and the possible application of this method in Central Asia and the Caucasus is discussed.

[Panteleev (A. M.).] **Пантелеев (А. М.). К вопросу о карантинных мероприятиях по ограждению от вредителей наших хлопководческих районов.** [On the Question of Quarantine Measures for the Protection of our Cotton Regions from Pests.]—**Хлопковое Дело** [*Cotton Industry*], iv, no. 1–2, pp. 72–74. Moscow, January-February 1925.

The more important cotton pests of Egypt and America do not occur in the Russian cotton fields, and every effort should be made to prevent their introduction. With this object the United States of America were asked to guarantee that all cotton exported by them to Russia was uninfested. This was refused, and the importance of organising adequate quarantine measures against the importation of foreign cotton pests into Russia is pointed out.

[Zverezomb-Zubovski (E. V.).] **Зверезомб-Зубовский (Е. В.). Некоторые данные о вредителях сельского хозяйства Донской Области.** [A few Notes on the Agricultural Pests of the Don Region.]—**Ростово-Нахичеванск. на Дону Област. С.Х. Опытн. Станц.** [*Rostov-Nakhitchevan-on-Don Reg. Agric. Expt. Sta.*], Bull. 174, 8 pp. Rostov-on-Don, 1924. [Received 14th April 1925.]

The report for 1918 [*R.A.E.*, A, viii, 107] was the last annual report published. The more important pests observed in the Don region since then are discussed. An outbreak of *Locusta* (*Pachytylus*) *migratoria*, L., occurred, and previous outbreaks of this locust in this region are reviewed, as are also previous measures against *Calliptamus italicus*, L., which has also occurred again recently. Other locusts recorded are *Arcyptera* (*Stethophyma*) *flavicosta*, Fisch., and *Oedaleus nigrofasciatus*, DeG.

Loxostege sticticalis, L., was unusually abundant in 1919, being also extremely injurious in 1920 and 1921. Other pests of importance are the maize moth [*Pyrausta nubilalis*, Hb.], *Bruchus* (*Laria*) *pisorum*, L. (*pisi*, L.), and an undetermined mining fly attacking peas.

[Sviridenko (P.).] **Свириденко (П.). Экономическое значение вредителей и болезней сельско-хозяйственных растений на северном Кавказе.** [The Economic Importance of Pests and Diseases of Agricultural Plants in the Northern Caucasus.]—**"Северо-Кавказский Край" Краевая Станция Защиты Раст. от Вредит. и Болез. С.-Х. Раст.** ["*North-Caucasian Region*" *Reg. Sta. Protect. Plants from Pests & Diseases Agric. Plants*], no. 2, separate 15 pp. Rostov-on-Don, 1925.

The enormous losses incurred as a result of neglected attack by insect pests and plant diseases in the Northern Caucasus are reviewed,

and the importance of the recent organisation of a close network of stations for the protection of agricultural crops is pointed out. Similar work in other countries is described.

[Parfentev (I. A.).] **Парфентьев (И. А.). Опыт с неполным голоданием гусениц** *Orgyia antiqua* **L.** [Experiments on the Influence of incomplete Starvation on the Larvae of *Notolophus antiquus*.]—*La Défense des Plantes*, i, no. 6, pp. 201–206. Leningrad, March 1925.

In these experiments with larvae of *Notolophus* (*Orgyia*) *antiquus*, L., the reactions to partial starvation varied in different individuals. Development was retarded, the number of moults increased and the adults that eventually emerged were smaller than the normal.

[Tarbinski (S. P.).] **Тарбинский (С. П.). К познанию Фауны прямокрылых Брянской губернии.** [The Orthopterous Fauna of the Bryansk Government.]—*La Défense des Plantes*, i, no. 6, pp. 206–210. Leningrad, March 1925.

This is a list of species collected, with oecological remarks. *Locusta migratoria*, L. ph. *danica*, L., appeared in considerable numbers in 1921 and 1922, but no transformation into ph. *migratoria* was observed.

[Samoilovitch (E. N.).] **Самойлович (Е. Н.). Предварительный список вредителей плодоводства северной области.** [Preliminary List of Orchard Pests of the Northern Region.]—*La Défense des Plantes*, i, no. 6, pp. 210–217. Leningrad, March 1925.

In all 73 different insect pests are here recorded from northern Russia, with brief notes as to local occurrence and food-plants. The list is arranged under the orders of the insects concerned.

[Baranov (N. I.).] **Баранов (Н. И.). Мароккская кобылка** (*Dociostaurus maroccanus* **Thunb.**) **в Черногории.** [*Dociostaurus maroccanus*, Thunb., in Montenegro.]—*La Défense des Plantes*, i, no. 6, pp. 217–218. Leningrad, March 1925.

The principal injurious grasshopper in Montenegro is *Dociostaurus maroccanus*, Thunb., which appears periodically. The measures adopted are spraying with crude oil and some mechanical ones, but the organisation is inadequate. The bionomics of grasshoppers and their parasites are being studied, the most important parasite yet found being a Tachinid, *Blaesoxypha lineata*, Fall.

[Fedorov (S. M.).] **Федоров (С. М.). Обзор главнейших вредителей сельского хозяйства а Таврической губернии с 1916 по 1924 год.** [Review of Agricultural Pests in the Government of Taurida in 1916–1924.]—*La Défense des Plantes*, i, no. 6, pp. 218–223. Leningrad, March 1925.

The insects recorded include *Calliptamus italicus*, L.; *Sipha maidis*, Pass., very abundant in 1919 on maize, wheat and oats; *Loxostege sticticalis*, L.; *Cledeobia moldavica*, Esp., particularly abundant on

Festuca ovina and other grasses; *Anisoplia austriaca*, Hbst.; *Plagionotus floralis*, Pall., abundant on lucerne; *Cephus pygmaeus*, L.; *Eulecanium* (*Lecanium*) *robiniarum*, Dougl., which is becoming a serious menace to the cultivation of *Robinia* in sandy soil, and has occasionally been found on apricots and plums; *Aporia crataegi*, L., becoming more abundant, most injury being caused to plums and apricots; *Hemerophila pariana*, Cl. (*Choreutis parialis*, L.), on pears and apples; *Eucosma* (*Tmetocera*) *ocellana*, F.; *Tortrix rosana*, L. (*laevigana*, Schiff.); *T. lecheana*, L.; *Phyllobius oblongus*, L., causing early defoliation of fruit trees; and *Polyphylla fullo*, L., which is a serious pest of orchards and vineyards on sandy soil, and is parasitised by the Tachinid, *Microphthalma disjuncta*, Wied., *Tiphia* sp., and *Scolia flavifrons* var. *haemorrhoidalis*, F.

[Osipov (N. A.).] **Осипов (Н. А.). Гороховая тля (*Macrosiphum pisi* Kaltb.) и опыты борьбы с нею в Татарской Республике.** [*Illinoia* (*M.*) *pisi*, Kalt., and its Control in the Tartar Republic.]—*La Défense des Plantes*, i, no. 6, pp. 223–224. Leningrad, March 1925.

Owing to the abundance of *Illinoia* (*Macrosiphum*) *pisi*, Kalt., in the Tartar Republic (Kazan) the cultivation of peas had been almost abandoned; the Aphid, however, disappeared from 1897 until 1922. Peas have been grown again in the meantime, and it is possible that the Aphid has been present, though there is no authentic record of its occurrence during this period. In order to find some efficient remedy within the means of the local peasant, wood ash was tried and proved effective at the rate of 1 part by weight to 5 parts by weight of cold water, provided that the spraying was repeated two or three times. Oak ash was superior to the others tested.

[Stark (V. N.).] **Старк (В. Н.). Несколько Фактов из биологии *Hylobius abietis* L.** [Some Facts in the Biology of *H. abietis*, L.]—*La Défense des Plantes*, i, no. 6, pp. 224–226. Leningrad, March 1925.

This information is given in the form of a short preliminary note in order to call attention to the great losses in the Briansk forests owing to the attacks of *Hylobius abietis*, L., on pine and spruce. The protection of the trees from attack is essential to produce a good stand, as trees exposed to injury for only one season show a marked difference in growth, the root system also being impaired.

[Arkhangelski (P.).] **Архангельский (П.). Заметка о капустной белянке (*Pieris brassicae* L.).** [Note on *P. brassicae*.]—*La Défense des Plantes*, i, no. 6, p. 239. Leningrad, March 1925.

It has been supposed that *Picris brassicae*, L., has only two generations a year in Turkestan, but the author's observations in the Fergana district in 1919 showed that the first generation occurs on wild crucifers in March and April, a second chiefly on cabbage and other cultivated and wild crucifers in May, June and part of July, a third from the end of June to the beginning of August, and a small fourth generation from August continuing into October. Some of the larvae of the latter are unable to complete their development before they are killed by the cold.

[Kulikov (I. V.).] **Куликов (И. В.). Дезинсекция синильной кислотой.** [Disinfection with Hydrocyanic Acid.]—**Труды Инст. Чист. Хим. Реакт.** [*Trans. Inst. Chem. React.*], pt. 3, **Сборн. Раб. Лабор. Инст.** [*Collect. Works Lab. Inst.*], pp. 19–33. Moscow, 1924. (Abstract in *La Défense des Plantes*, i, no. 6, p. 243. Leningrad, March 1925.)

Hydrocyanic acid gas was used with success for the fumigation of a museum with two hundred thousand cubic feet of space, in which *Sitodrepa* (*Anobium*) *panicea*, L., had become unusually abundant. The beetles appeared to be very susceptible to the gas and died in from 10 to 15 minutes at concentrations of 0·5 mgr. HCN to 1 litre of air at 15° C. [59° F.]. Clothes moths are more resistant, the same concentration being fatal only after 3 hours' exposure. In an appendix instructions are given for the disinfection of dwellings, railway carriages, clothing, etc.

[Uvarov (B. P.).] **Уваров (Б. П.). Саранчевые Европейской части СССР и Западной Сибири.** [Acrididae of European Russia and Western Siberia.]—120 pp., 115 figs. Moscow, Nat. Comm. Agric. "Ozra," 1925.

This book is intended to serve for the identification of all Acrididae known from the area named in the title. The general part includes outlines of morphology, development, oecology, and geographical distribution, with instructions for collecting, preserving and naming these insects. In the special part, keys and brief descriptions of species are given, with full records of distribution and notes on the bionomics and oecology of each species.

Ruszkowski (J.). **Owady szkodliwe dla pól i ogrodów warzywnych obserwowane w r. 1921 w okolicach Poznania.** [Insect Pests of Field and Vegetable Crops observed in 1921 near Posen.]—*Ziemianin*, lxxiii, no. 5, pp. 193–196. Posen, 1922.

Szkodniki zwierzęce sadow owocowych okolic Poznania obserwowane w r. 1921. [Orchard Pests recorded in 1921 near Posen.]—*Ziemianin*, lxxiii, no. 7, pp. 264–270. Posen, 1922.

Szkodniki sadow okolic Poznania w 1922 r. [Orchard Pests near Posen in 1922.]—*Choroby i szkodniki roslin*, 1925, no. 1, separate 5 pp. [*sine loco.*] [Received 7th May 1925.]

Lists of the insect pests recorded during 1921 and 1922 near Posen are given, with brief notes as to seasonal occurrence and food-plants.

Prohaska (K.). **Beitrag zur Kenntnis der Hemipteren Kärntens.** [A Contribution to the Knowledge of the Hemiptera of Carinthia.] —*Carinthia*, ii, pp. 32–101. Klagenfurt, 1923. (Abstract in *Neuheiten Geb. Pflanzenschutzes*, 1925, no. 1, p. 17. Vienna, 1925.)

The following injurious Rhynchota occur in Carinthia: *Palomena viridissima*, Poda, *Eurydema ornatum*, L., var. *dissimile*, F., and *E. oleraceum*, L., on cabbage and other crucifers; *Aphanus pini*, L., *Scolopostethus affinis*, Schill., and *Anthocoris nemorum*, L., common and very harmful on willow catkins and alder buds; *Lygus kalmi*, L.,

on *Carum* and *Pimpinella*; *Psallus ambiguus*, Fall., on apple and pear together with *Atractotomus mali*, Mey., which is even more injurious; *Chlamydatus pulicarius*, Fall., which occurs with *Lygus pratensis*, a great pest of grass; *Gargara genistae*, F., on *Cytisus nigricans*, and *Deltocephalus* spp., on grass, which are very injurious; and *Acharotile albosignata*, Dahlb., which occurs on juniper, and is a pest of clover.

[Pliginski (V.).] **Плигинский (В.). Приготовление и употребление хлористого бария.** [The Preparation and Application of Barium Chloride.]—**Курская Губ. Стан. Защиты Раст. от Вредит. С.Х.** [*Kursk Govt. Sta. Protect. Plants from Agric. Pests.*], no. 32, 9 pp. Kursk [n.d.] [Received 19th May 1925.]

Barium chloride is both a useful stomach poison and a contact insecticide. The strength of the spray to be used depends on the pest to be controlled and the plants to be sprayed. Beet and cabbage can withstand much stronger solutions than fruit trees, on which about ½ lb. to 2 gals. produces scorching. The strength varies from 4 to 13½ lb. of barium chloride to 27 gals. of water and 1 tablespoon of washing soda. The barium chloride should be completely dissolved in a small quantity of water, which may be placed on the fire for this purpose; the rest of the water is then added. The addition of the washing soda (also dissolved in water) makes the spray more adhesive and renders the sprayed portions easily visible.

[Merezhkovski (S. S.).] **Мережковский (С. С.). О бацилле** (*Coccobacillus acridiorum*), **предложенном d'Herelle'ом для истребления саранчи.** [*C. acridiorum* suggested by d'Herelle for the Control of Locusts.]—**Извест. Госуд. Инст. Опытн. Агрон.** [*Ann. State Inst. Expt. Agron.*], iii, no. 1, pp. 7–13. Leningrad, 1925.

A preliminary notice of the author's observations was published in 1913 [*R.A.E.*, A, v, 195]. The three bacilli considered by d'Herelle, in turn, to be the causal agent of the epizootic in locusts are not pathogenic to them. Together with a large number of other bacteria they represent the normal flora of the blood of these insects.

[Prozorov (S. S.).] **Прозоров (С. С.). Сосновый красноголовый пилильщик—ткач** *Lyda erythrocephala*, **L.** [The Pine Redheaded Sawfly—*Acantholyda erythrocephala*, L.]—**Труды Сибирск. с.х. Акад.** [*Trans. Siberian Agric. Acad.*], iv, Suppl., Separate, 21 pp., 1 graph. Omsk, 1925.

During 1922-23 a detailed study was made of the sawfly, *Acantholyda* (*Lyda*) *erythrocephala*, L., which was responsible for considerable injury to *Pinus silvestris* in the vicinity of Omsk. Observations were made in nature and under artificial conditions as near as possible to those found in nature. The eggs are laid on the needles of 17-22 year old trees in the first half of June, parthenogenesis occuring to some extent. They hatch in from 5 to 8 days, the larvae feeding on the needles, which are sawn off and consumed inside the web made by the larvae. There is only one generation a year, the larval stage lasting about 11 months. The larvae descend from the branches by silken threads at the end of July or beginning of August. Hibernation occurs in the soil in a smooth chamber prepared by them, in which they pupate

during the latter half of May. The pupal stage lasts from 15 to 18 days, the first adults being seen on 30th May. As a result of the feeding of the larvae on the needles the growth of the heartwood of the tree is interfered with. During 1923 the year's growth of 20 year old trees was diminished by $\frac{1}{8}$ in pure stands of pine; mixed forests are less severely injured. The weakened trees are more susceptible to attack by other pests, such as bark-beetles, and the young shoots have been found to be attacked by *Myelophilus piniperda*, L.

Preventive measures consist of having mixed stands and improving the condition of the trees by the regular application of forestry methods. Soil disinfection experiments with carbon bisulphide carried out in September gave no positive results, and should be tried against the pupae at the end of May and beginning of June. About 20th June, when all eggs have been laid, all attacked trees that are unlikely to recover should be felled and the crowns and branches immediately burnt. Domestic animals might be of some use towards the end of July when the larvae are descending for hibernation. In the late autumn and early spring many of the larvae may be destroyed by exposing them to frost by digging the ground round the tree to a depth of about four inches. It is not necessary to go nearer than eight inches to the tree, but the belt should extend to four feet. Where possible, stomach poisons may be applied in the second half of July.

[Moritz-Romanova (Z. E.).] **Мориц-Романова (З. Е.). Приманки в борьбе с азиатской саранчей.** [Poison Baits for the Control of *Locusta migratoria*, L.]—**Средне-Азиатская Опытн. Станц. Защиты Раст.** [*Central-Asiatic Expt. Sta. Plant Protect.*], 28 pp., 5 figs. 2 diagrams. Tashkent, 1925.

Isolated attempts to use poisoned baits against the Asiatic locust [*Locusta migratoria*] made in Turkestan in 1923 did not give satisfactory results, and the author conducted a series of large scale field experiments in 1924 to elucidate the problem. The methods used for calculating the relative effectiveness of various baits under different conditions were as follows:—Swarms of locust larvae of the first and second stage selected for the experiments were enclosed in portable sheet-iron walls, and the numbers of living larvae before the experiment and 12 and 24 hours after estimated by direct count. The numbers of larvae in swarms of later stages were estimated in the evening or morning, when all have settled on reeds, by calculating the average number of larvae on one reed, the average number of reeds per square unit and the space occupied by the swarm; this was repeated 24 hours later. Attempts to calculate mortality on the basis of numbers of dead locusts have shown that this method is very unreliable, since dead larvae are scattered over the whole route traversed by a swarm during the day, and many of them are concealed in cracks of the soil, under plants, etc.

As carriers for poison baits, wheat-bran, flour made of crushed cottonseed, rice-bran, rice-husk, horse-dung and sawdust were tried. The first two proved to be the most attractive to locusts, and were used for control on a large scale; rice-bran was also found satisfactory, but the others gave negative results. Baits of wheat-bran are the cheapest, while the cost of application of ground cottonseed is very high owing to its weight. Of the various poisons experimented with, Paris green and white arsenic were found the best and easiest to handle. The doses must vary according to the age of the larvae; for

those of the second, third and the beginning of the fourth stage, 2 lb. Paris green, or 1½ lb. sodium arsenite to 40 lb. of the carrier are necessary, while for larger larvae the dose must be increased up to 2·5 lb. Paris green, or to 2 lb. white arsenic.

The hoppers in the first stage were not attracted by baits. For later stages the baits must be scattered in the evening, or very early in the morning. The best results were obtained where the vegetation was not too dense and patches of bare soil occurred. Cool weather, when the swarms do not move much, is favourable for using baits, but the effect is slower in making its appearance.

[Nevski (V. P.).] **Невский (В. П.). Материалы по биологии кровяной яблоневой тли** *Eriosoma lanigerum* **Hausm. и борьба с ней в Туркестане.** [The Biology of *E. lanigerum* and its Control in Turkestan.]—**Средне-Азиатская Опытная Станц. Защиты Раст.** [*Central-Asiatic Expt. Sta. Plant Protect.*], 97 pp., 23 tables, Tashkent, 1925.

A detailed account is given of observations on *Eriosoma lanigerum*, Hausm., studied under laboratory and field conditions in Turkestan, including descriptions of the various stages and their habits. The technique employed is described. Under natural conditions in Turkestan, *E. lanigerum* is only found on the cultivated apple, and all attempts to transfer it to *Ulmus campestris* have failed. The successive generations are maintained entirely by parthenogenesis; although in the spring and autumn winged forms appear, giving rise to sexual forms that lay eggs, these never complete their development. The winter is passed in various stages of larval development or as adults. Hibernation usually occurs between November and March; should the temperature drop sufficiently after the spring activities of the Aphids have begun, they may become dormant again until suitable conditions arise. The hibernating individuals may occur on any part of the tree, but only those in sheltered positions survive to the following spring. An average of 15 generations occurs annually. The Aphids are most prolific during April and May; reproduction diminishes during the hotter summer months and increases again in September and October, showing a second fall in November and December. In the spring, the hibernating individuals begin feeding at the site of hibernation by sucking the plant juices as they rise to the surface. Depending on this food supply and weather conditions the hibernated larvae develop and give rise to the first spring generation (March-April). From the second half of April the Aphids migrate to the branches and young shoots. Owing to the different stages of development of the hibernating individuals the various generations overlap. Towards the end of April and May the second generation is produced, this being the most important from the point of view of numbers. During the existence of this generation, natural enemies such as birds, Coccinellids, etc., are most active. Some of the larvae of this generation develop wings and are homologous with the American spring migrants of the third generation migrating from elm to the summer food-plants. The winged forms are produced in very small numbers (sometimes only one in a colony). They only live 5-7 days, but as they die out others appear, continuing a thin chain of succession until the seventh generation. These winged forms produce males and females that lay eggs, which do not develop, and also parthenogenetic

females, which, however, do not produce lasting progeny. From the third generation to the thirteenth, normal apterous parthenogenetic females are produced. During July and August the ninth and tenth generations are greatly reduced as a result of the heat and diminished food-supply. At this time the root forms continue normal reproduction, and apparently this is the chief time of migration from the parts of the tree above ground to the roots. The autumn winged forms appear in the thirteenth generation at the beginning of September and become quite numerous in the second half of the month, corresponding to the American autumn migrants that return from apple to elm. A survived instinct forces them to attempt flight; thus scattered, they produce sexual individuals that lay eggs at the place of their birth. These eggs begin development and pass the winter, but never hatch. Meanwhile parthenogenetic reproduction continues. Under Tashkent conditions it is possible for 17 generations to develop with an average of 15 days for each. No diseases or insect parasites have been found in Turkestan, but those recorded elsewhere are reviewed.

Various insecticides have been tested, the best results being obtained with 1 lb. tobacco dust (waste) and ½ lb. soap (or 1 lb. soap and ¼ lb. of the dust) to 3 gals. water, or with lime-kerosene emulsion (3 lb. kerosene, 2 oz. lime and 3 gals. water). The method recommended as being cheaper is to clean the trees and paint them with some form of grease. A layer of fine dust around the base of the tree will prevent the migration of the Aphids either from or to the roots. The roots may be dusted with ash, tobacco dust or slaked lime up to a depth of 8 ins., at the rate of from 2½ to 5 gals. per tree according to the size of the tree. This should be done at least once a year, preferably in the spring. The importance of general clean cultivation and attention to the trees is pointed out.

Faes (H.) & Staehelin (M.). **La lutte contre les vers de la vigne.**—*Terre vaudoise*, xvii, nos. 20, 21 & 22, pp. 297–303, 313–319 & 325–329, 10 figs. Lausanne, 16th, 23rd and 30th May 1925.

This paper on the control of the vine-moths, *Clysia ambiguella* and *Polychrosis botrana*, has been noticed from another source [*R.A.E.*, xiii, 301].

Martinet (G.). **L'Anguillule du blé niellé** (*Tylenchus scandens*).—*Terre vaudoise*, xvii, no. 22, pp. 322–324, 2 figs. Lausanne, 30th May 1925.

The Nematode, *Tylenchus scandens*, occasionally causes considerable damage to wheat in France, distorting the leaves in spring and attacking the ears in June, causing the formation of small, dark-coloured grain, which contains no starch but only a hard mass of the Nematodes. When the infested grains fall, the Nematodes leave them and attack fresh plants, become sexually mature and reproduce. In stored grain they may remain latent, though alive, for 10 or even 20 years. All infested grains (which are readily distinguishable owing to their small size) should be sorted out from the healthy grain, and any lying about on the ground should be removed and burnt. Infested wheat should be followed by a forage crop mixed with a certain

proportion of wheat; the Nematodes infesting the soil will attack the wheat, which should be cut down while green and used as fodder. Treatment of the seed with copper sulphate, which is practised by many growers, is useless, as the husk of the infested grain is impermeable.

Wolff (M.) & Krausse (A.). **Die Krankheiten der Forleule und ihre prognostische Bedeutung für die Praxis.** [The Diseases of the Pine Moth and their Importance in Prognosis in Practice.]—8vo., 102 pp., 32 pls. Breslau, Heger Verlag Wilh. Gottl. Korn, 1925. Price 2 Marks.

This work is intended to guide the forester in judging the factors influencing the increase of the pine moth [*Panolis flammea*] in Germany. The first section deals with insect and other animal enemies, protozoa and fungi, the second with the effect of soil and weather, and the third with the recovery of the pine tree after infestation by the moth.

Seiff (W.). *Hylobius abietis* **L. in stehenden jungen Weymouthskiefern.** [*H. abietis* in standing young Weymouth Pines.]—*Forstwiss. Centralbl.*, xlvii, pp. 334–337. Berlin, 1925.

A case of *Hylobius abietis* breeding in young Weymouth pines [*Pinus strobus*] was observed in Bavaria in September 1923 in a plantation 8-10 years old. Twenty of the pines were dead. All were heavily infested by *Pityogenes bidentatus*, five showed traces of *Pissodes notatus*, and in ten the mines of *H. abietis* were found in the larger roots and at the foot of the stems. The fully mature larvae were already in the pupal cases ready to hibernate. The infestation was probably due to the clay soil, which is not suitable for Weymouth pine, the dry summer of 1923, and the presence of *Pityogenes bidentatus*. *Pissodes notatus* probably attacked the root-collars at the same time. The Weymouth pines were mixed with other pines, but these were not infested either by *Hylobius* or the other beetles, because they had not suffered through the dryness of the soil and are not a preferred food-plant.

v. Butovitsch (V.). **Ueber die Sterblichkeit des grossen Waldgärtners (*Blastophagus piniperda* L.) und seiner Brut.** [On the Mortality of *Myelophilus piniperda* and of its Brood.]—*Ent. Bl.*, xxi, no. 1, pp. 41–43. Berlin, 31st March 1925. [Received 11th May 1925.]

Whereas nearly the whole brood of the pine beetle, *Myelophilus* (*Blastophagus*) *minor*, Htg., reaches the adult stage, only a few individuals of *M.* (*B.*) *piniperda*, L., do so, owing to a number of adverse factors. One of its most dangerous enemies, *Thanasimus* (*Clerus*) *formicarius*, L., is usually entirely innocuous as regards *M. minor*. In 150 pines infested by *M. piniperda* and varying in age from 20 to 100 years about one-third of the eggs or newly-hatched larvae were destroyed, and 72 per cent. of the remainder perished in the larval and pupal stages, so that, finally, only 18-19 adults result from 100 eggs. It is more difficult to determine the destruction of the adults. *T. formicarius* can devour two beetles daily.

Gasow (H.). **Die Bekämpfung der Wiesenschnake auf dem Grünlande.** [Measures against Tipulids in Grasslands.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 75, 4 pp., 3 figs. Berlin, April 1925.

In Germany Tipulids have caused considerable losses to the hay crop. The chief species is *Tipula oleracea*, L., with which species *T. paludosa*, Mg., is thought by many to be identical. *Pachyrrhina maculosa*, Mg., also causes harm. After a brief description of the biology of these pests, the various recognised measures for combating them are mentioned, including the "furrowing wheel," used in Holland [*R.A.E.*, A, x, 428]. Another measure adopted in Holland is the use of a poison-bait as described by Packard and Thompson [A, ix, 576].

Titschack (E.). **Untersuchungen über den Temperatureinfluss auf die Kleidermotte** (*Tineola biselliella*, **Hum.**). [Investigations as to the Influence of Temperature on the Clothes Moth (*T. biselliella*).]—*Zs. wiss. Zool.*, cxxiv, no. 2, pp. 213–251. Leipzig, 5th April 1925.

The question of the influence of temperature on *Tineola biselliella*, Hum., is dealt with more fully than in a former article [*R.A.E.*, A, xi, 367].

Other things being equal, the duration of the separate stages is shortened by raising the temperature, the larvae that develop in a lower temperature, and therefore take longer to reach maturity, being larger and consuming more food. On the other hand, a higher temperature increases the productive powers of the moth. Numerous tables show the variation in weight of the insects and in the amount of food consumed according to the temperature at which they are bred.

Vitzthum (H.). **Die Milbenkunde (Acarologie) in ihrer praktischen Bedeutung.** [The practical Importance of a Knowledge of Mites.]—*Anz. Schädlingsk.*, i, no. 5, pp. 49–51. Berlin, 1925.

A brief survey is given of the mites affecting crops and stored foodstuffs and causing disease in man and animals.

Prell (H.). **Grüne Schlupfwespenkokons in Kieferneulenrevieren.** [Green Cocoons of Hymenopterous Parasites in Districts infested by the Pine Moth.]—*Anz. Schädlingsk.*, i, no. 5, pp. 54–55. Berlin, 1925.

Early in 1925 the author obtained a number of cocoons of a Braconid, *Microplitis decipiens*, sp. n., in a district infested by the pine moth [*Panolis flammea*]. The species of this genus are not parasites of the pupae of the moth as stated by Ratzeburg. They attack and kill the young larvae before the period of worst injury begins. The Braconid larva pupates in various situations. The hibernation period lasts until the end of April when the adult emerges. This Braconid is itself attacked by parasites when in the pupal stage.

Eckstein (K.). **Die Kiefernnadelscheidengallmücke,** *Diplosis* (*Cecidomyia*) *brachyntera*, **Schwaegr.** [The Pine Needle Sheath Midge, *D. brachyntera*.]—*Anz. Schädlingsk.*, i, no. 5, pp. 55–57. Berlin, 1925.

Considerable injury is now being done to pines in Bavaria, Saxony and Czecho-Slovakia by the pine-needle-sheath midge, *Diplosis*

brachyntera, Schwaegr. This Cecidomyiid oviposits between the two needles forming a pair on the new pine shoots in May. As a result, the bases of the two needles grow together, enclosing a chamber. The larvae occur from June onwards. They migrate from the gall before pupating, and this migration may take place in autumn or during the winter. The cocoons may be found beneath lichens or the scales of the bark and often occur beneath the needle-sheaths. In the last case, provided that the needles drop in autumn, hibernation occurs on the ground. In cases of a severe infestation entire twigs may be killed.

Pohl (W.). **Waldstreudüngung und Drahtwurmbefall.** [Manuring with Forest Litter and Attack by Wireworms.]—*Anz. Schädlingsk.*, i, no. 5, p. 58. Berlin, 1925.

If forest litter is used as stable litter and removed daily for manuring, infestation by wireworms of the ground thus manured always follows, but this is not the case if the litter is left in animal quarters, such as those of sheep, which are cleared only once or twice a year.

Blunck (H.). **Biologische Unterschiede schädlicher Drahtwurmarten.** [Biological Differences in injurious Wireworms.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 5, pp. 37–39, 8 figs. Berlin, 1st May 1925.

It is now established that various species of Elaterids differ as regards food, and requirements relating to soils, developmental and hibernation conditions. Of some 130 species found in Germany, about twelve are injurious, and a table is given showing, for each species, the time of the year when the occurrence of the adult and larva is observed, the injury done, and the time of occurrence of the pupa and young adult. The details that follow refer to the adult unless otherwise stated.

Lacon murinus occurs between March and October and attacks young bark of oak and the flower-stems of rose ; the larva is a pest of forest seedlings, vegetables, potatoes and ornamental plants. *Athous haemorrhoidalis* occurs between May and July ; the larva attacks potatoes more readily than cereals or grasses. *A. niger* occurs between May and August ; its larva infests cereals, root-crops, tobacco and forest seedlings. *A. subfuscus* occurs between April and September ; the larva is chiefly predacious, but injures forest seedlings. *Corymbites purpureus* occurs from May to July and injures the young bark of oak. *C. castaneus* occurs from April to July and injures the buds and blossoms of fruit trees and the young shoots of oak. *C. tessellatus* occurs from May to July, injuring the young bark of oak and pine. *Selatosomus aeneus* occurs from March to October ; its larva attacks cereals, root-crops, tobacco, forest seedlings and the roots of young timber. *Agriotes aterrimus* occurs from May to July and attacks the young bark of oak ; its larva injures forest seedlings. *A. lineatus* occurs from May to July ; its larva attacks field crops, vegetables, ornamental plants and forest seedlings. *A. obscurus* occurs from May to July ; the larva injures cereals, root-crops and fodder, and ornamental plants. *A. sputator* occurs from May to June ; the larva is a pest of sugar-beet, carrots and other vegetables and, to a less degree, potatoes. *Dolopius marginatus* occurs from May to July and attacks the young bark of oak and pine ; its larva injures forest seedlings and the roots of young timber.

TEMPEL (W.). **Auftreten von Kleestengelbrenner und Kleewurzelhalsfliege.** [Occurrence of Clover Anthracnose and Clover Collar Fly.]—*Die Kranke Pflanze*, i, no. 7, pp. 132–133. 1924. [Abstract in *Rev. App. Mycol.*, iv, pt. 5, p. 291. Kew, May 1925.]

During 1924, from 30 to 40 per cent. of a clover crop near Chemnitz (Saxony) were in a dying condition. This was at first attributed to anthracnose (*Gloeosporium caulivorum*), but subsequently proved to be due to the presence of *Psila atra*, Meig. (clover collar fly). Plants in a similar condition in other localities were also attacked by the same fly, as well as by *Sitona lineata*, L.

RUSCHKA (F.). **Chalcididenstudien. III. Die europäischen Arten der Gattung *Chalcis*, Fabr.** [Chalcid Studies. III. The European Species of the Genus *Chalcis*, Fabr.]—*Konowia*, i, no. 4–5, pp. 221–233. Vienna, 20th August 1922. [Received 25th May 1925.]

A key is given to the European species of *Chalcis*, including *C. secundaria*, sp.n., a hyperparasite of *Pieris daplidice*, L., and also obtained, probably as a hyperparasite, from *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.).

[VERESHTCHAGIN (B.).] **Верещагин (Б.). Спасайте сливы.** [Save the Plums.]—**Фурника** [*Furnika*], no. 4, 1 p. [Kishinev] 15th February 1925. [Received 29th May 1925.]

Instructions are given for the control of *Eulecanium* (*Physokermes*) *coryli*, L., on plums in Bessarabia by spraying with lime-sulphur.

[VERESHTCHAGIN (B.).] **Верещагин (Б.). Яблоновая и плодовая моли (*Hyponomeuta malinellus* и *variabilis* Zell.) и мѣры борьбы съ ними.** [*Hyponomeuta malinellus*, Zell., and *H. variabilis*, Zell., and their Control.]—**Фурника** [*Furnika*], no. 6, p. 4. [Kishinev] 15th March 1925.

A brief and popular account is given of *Hyponomeuta malinellus*, Zell., and *H. variabilis*, Zell., and their control on apples. The recommendations include instructions for the preparation and application of arsenical sprays.

[VERESHTCHAGIN (B.).] **Верещагин (Б.). Кратній обзоръ вредителей сельско-хозяйственныхъ растеній, наблюдавшихся въ Бессаробіи въ 1924 году.** [Brief Review of Pests of Agricultural Plants observed in Bessarabia in 1924.]—**Фурника** [*Furnika*], no. 8, 1 p. [Kishinev] 15th April 1925.

Brief notes are given on some of the more important pests observed in 1924, which have been recorded in previous years [*R.A.E.*, A, xi, 43, 149; xii, 440]. *Cnethocampa processionea*, L., occurred in unusual abundance at first on oak and then migrated to fruit trees together with *Malacosoma* (*Lasiocampa*) *neustria*, L.

ZIMMERMAN (F.). **Dvě nová poškození rostlin roztoči.** [Two New Mites injurious to Plants.]—*Ochrana Rostlin*, v, no. 2, pp. 19–21, 2 figs. Prague, May 1925.

The galls produced by *Epitrimerus pyri*, Nal., on varieties of pear are described. Those described from *Buxus sempervirens* are due to *Eriophyes canestrinii hypophyllus*, Nal.

FIALA (F.). **Skůdcové kvetoucího obilí na Slovensku a v Podkarpatské Rusi.** [Pests of Cereals in Czecho-Slovakia and the Slopes of the Eastern Carpathians.]—*Ochrana Rostlin*, v, no. 2, pp. 24–27. Prague, May 1925.

The species recorded are *Epicometis hirta*, Poda, *Oxythyrea funesta*, Poda, *Cetonia aurata*, L., *Anisoplia lata*, Er., *A. segetum*, Hbst., *A. agricola*, F., *A. flavipennis*, Brül., *A. cyathigera*, Scop. (*crucifera*, Hbst.), and *Amphimallus* (*Rhizotrogus*) *solstitialis*, L.

Hand collection is generally practised, but the importance of clean cultivation and general stimulation of the crops is also pointed out.

KUTÍN (A.). **Nomenklatura chorob bramborových a jejich původců.** [Nomenclature of Potato Diseases and their Causes.]—*Ochrana Rostlin*, v, no. 2, pp. 27–28. Prague, May 1925.

A list is given of the popular names of the various diseases affecting potatoes and the scientific names of the different causative agents, including a number of insect pests.

BLATTNÝ (C.). **Entomologické poznámky. II.** [Entomological Notes. II.]—*Ochrana Rostlin*, v, no. 2, pp. 28–31, 2 figs. Prague, May 1925.

A brief preliminary description is given of the salivary glands of *Lachnus juglandis* and *Rhopalosiphum lactucae*. The eggs of *Tuberolachnus roboris* are laid on the south side of 3 to 5 year old oak twigs. The larvae immediately after moulting crawl to the north side.

Phyllobius oblongus was abundant in southern Czecho-Slovakia, destroying the blossoms of cherries and plums, and *Phyllopertha horticola* occurred in the same district, injuring young apple seedlings. *Nygmia phaeorrhoea* (*Euproctis chrysorrhoea*) feeds on fruit blossoms.

Other pests recorded are *Hyponomeuta malinellus*, *Chaitophorinella testudinata* (*Aphis aceris*), *Thrips sambuci*, *Tetranychus telarius*, which was attacked by *Bremia* sp., *Orphania denticauda*, and *Eulecanium* (*Lecanium*) *corni*, which was destroyed by *Exochomus quadripustulatus*.

THEOBALD (F. V.) & RAMSBOTTOM (J.). **The Enemies of the Rose.**—New Edition, 165 pp., 11 pls., figs. London, National Rose Soc., 1925. Price 7*s.* 6*d.*

In the first part (pp. 1-109) of this handbook the life-histories of the commoner and more important insect pests of the rose in Britain are described, with instructions for keeping them in check and destroying them. A key to the Aphids occurring on roses is given. Nicotine is recommended as by far the best general wash for roses, especially as it does not harm or disfigure the foliage or even the blossoms.

HODSON (W. E. H.) & BEAUMONT (A.). **First Annual Report of the Department of Plant Pathology for the Year ending September 30th 1924.**—*Seale-Hayne Agric. Coll.*, Pamphlet no. 16, 31 pp. Newton Abbot, Devon [n.d.]. [Received 18th May 1925.]

A house of mixed plants under heat, with a content of roughly 9,000 cu. ft., was fumigated in February 1924 with tetrachlorethane at the rate of ½ pt. per 1,000 cu. ft. The fumigant was poured on the floor,

exposure lasting 12 hours. After the first application all adults and nymphs of *Trialeurodes* (*Aleurodes*) *vaporariorum* were dead, but the eggs subsequently hatched. Some of the plants were more or less scorched, those driest at the roots suffering most. A second application was made 14 days after the first, and no further infestation by *T. vaporariorum* has been noticed. *Aphelinus mali* was released in Cornwall early in May, and parasitised clusters of the woolly apple aphis [*Eriosoma lanigerum*] were found from the end of August onwards at some distance from the points of introduction.

Notes are given on the pests of common occurrence. *Lema melanopa* was common in east Devon both on barley and oats, but in no case was any appreciable damage done; *Oscinella* (*Oscinis*) *frit* caused extensive damage; *Hypera* (*Phytonomus*) *nigrirostris* and other weevils of this genus appear to be increasing in importance as clover pests, the adults being found hibernating in large numbers with *Apion* spp. in stacked forage; *Apion trifolii* was more abundant than *A. apricans*, and these weevils migrated from the hedgerows to clover in April; *Anthonomus pomorum* (apple blossom weevil) caused severe damage in parts of south Devon, but a large number of the larvae were drowned in the capped blossoms by the heavy storms in May, and sacking bands proved an effective means of trapping; *Contarinia* (*Diplosis*) *pyrivora* (pear midge) destroyed as much as 90 per cent. of the crop in some parts of Cornwall and Devon, but where poultry had run under the trees the previous year the attack was negligible; *Eriosoma lanigerum* was unusually scarce; *Capitophorus ribis* was abundant and caused severe injury to currant bushes; *Tipula oleracea* was found on almost every type of crop, the attacks invariably occurring after ley, and in most cases injury could probably be prevented by better cultural methods; *Euxoa segetum* may be satisfactorily controlled by poison baits where practicable; the larvae of *Barypithes* (*Exomias*) *araneiformis* occurred commonly among the roots of strawberry plants in the winter, but no serious damage was noticed; *Otiorrhynchus sulcatus* caused serious injury to strawberries in south-west Devon, and as many as forty larvae were found tunnelling in one root stock; *Anthonomus rubi* was remarkably scarce on strawberries.

The general features of "patch" disease causing the death of strawberry plants in the Tamar Valley are described, and the possible relation between the disease and *Aphelenchus fragariae* is discussed. No definite statement as to the causal agent can however yet be made. The "red plant" disease recorded by Ballard and Peren [*R.A.E.*, A, xi, 539] as being due to *A. fragariae* appears to be more like an early stage of "cauliflower" disease and is perhaps distinct from the true "red plant." The "tulip root" disease of oats has been prevalent during the year. It is due to the presence of *Tylenchus dipsaci* (*devastatrix*) in the soft tissues at the basal portion of the stem; the crops have been reduced by from 5 to 90 per cent. in some cases by this Nematode. Spring and autumn sown crops are both liable to attack, and oats should not be grown on infected fields for several years. *T. dipsaci* does not appreciably attack bulbs, the narcissus flies, *Merodon equestris* and *Eumerus* spp., however, occur regularly throughout the West Country. *Rhizoglyphus echinopus* (*spinitarsus*) is considered responsible for a large percentage of the "soft" bulbs.

A list is given of the insect pests occurring in Devon and Cornwall arranged under the general order of the crops attacked, and including brief notes as to local and seasonal occurrence.

Silvela (F.). **La** *Ceratitis capitata.*—*Bol. Agric. téc. y. econ.*, xvii, no. 196, Sec. doctrinal, pp. 169–174. Madrid, 30th April 1925.

The measures to be taken against *Ceratitis capitata* are briefly described. The formula for a poison-bait to be placed in pots or other containers is as follows: molasses 4½ lb., lead arsenate 5 lb. 11 oz., water to make 60 gals.; for a bait to be sprayed on foliage or on bundles of twigs (Lotrionte method) the proportions are: molasses 72 lb., lead arsenate 2¼ lb. and water to make 60 gals. In each case the juice of a dozen oranges must be incorporated. As the mixture ferments in 48 hours, only sufficient for immediate use should be prepared. Another bait-method is that of Newman [*R.A.E.*, A, xii, 411], which is being tested in Spain. Attention is also drawn to experiments now being made in Spain with cold storage as a means of killing the eggs and larvae in harvested fruits.

Berlese (A.). **La mosca delle olive e il modo di combatterla per salvare il prodotto.** [The Olive Fly and the Method for combating it in order to save the Crop.]—*Riv. Agric.*, xxx, no. 20, pp. 312–314. Rome, 15th May 1925.

This is a brief account of the injury done by the olive fly [*Dacus oleae*] and of the author's method for controlling it by means of poison-baits.

Grippo (N.). **Mezzi per combattere le malattie delle piante nel periodo primaverile.** [Means for combating Plant Pests and Diseases in Spring.]—*Il Picentino*, xiv, no. 3–4, pp. 53–55. Salerno, 1925.

A spray of 1 per cent. lead arsenate is recommended against *Hyponomeuta malinellus* and *H. padellus* attacking plums, *Cydia* (*Carpocapsa*) *pomonella* attacking apple, and *C. splendana* attacking chestnut. *Myzus* (*Aphis*) *persicae* and *M.* (*A.*) *amygdali* infesting the peach require a solution of carbolic tobacco extract of 1–2 per cent. strength, or a decoction of quassia, 4–5 per cent. By adding 2 lb. of lead arsenate or 3 lb. of carbolic tobacco extract to 20 gals. of Bordeaux mixture the larvae of the vine-moths, *Clysia ambiguella* and *Polychrosis botrana*, may be checked in May, together with the larvae of *Anomala vitis*. *Chrysomphalus dictyospermi* and other scales attacking *Citrus* require spraying with a 6 per cent. solution of calcium polysulphide. The mulberry scale, *Aulacaspis* (*Diaspis*) *pentagona*, should be combated by introducing *Prospaltella berlesei*.

Wilkinson (D. S.). **Cotton Boll Worms.—Their Life History and Control.**—*Cyprus Agric. Jl.*, xx, pt. 2, pp. 64–66. Nicosia, April 1925.

Considerable damage to cotton bolls has been caused in Cyprus by *Earias insulana* and *Platyedra* (*Gelechia*) *gossypiella*. The life-histories of these moths are outlined, and the measures against them ordered by the Government are described. The date on or before which growers are required by law to destroy all cotton, etc., is to be fixed annually and will probably be about 15th October.

Treherne (R. C.) & Ruhman (M. H.). **The Peach-twig Borer** (*Anarsia lineatella* **Zell.**) ; **The Cabbage-root Maggot** (*Phorbia brassicae* **Bouché**) ; **The Woolly Aphid of the Apple** (*Eriosoma lanigerum*) ; **The Currant Gall-mite** (*Eriophyes ribis* **Nalepa**) ; **The Onion Thrips** (*Thrips tabaci* **Lind.**) ; **The Imported Cabbage-worm** (*Pieris rapae* **Linn.**) ; **The Lesser Apple Worm** (*Enarmonia* (*Laspeyresia*) *prunivora* **Walsh**) **and Codling Moth** (*Cydia pomonella* **Linn.**) ; **Apple-Aphides ; Soap Solutions for Spraying ; The Oyster-shell Scale** (*Lepidosaphes ulmi,* **Linn.**).—*Br. Columbia Dept. Agric.*, Circs. 31 (2nd Edn.), 32, and 34–41 (2nd Edn.), New Hortic. Ser., pp. 4, 7, 4, 3, 4, 4, 3, 7, 3, 4, numerous figs. Victoria, B.C., 1918–1923. [Received 29th May 1925.]

In each case a brief popular account is given of the insect concerned, and recommendations are made for its control.

Criddle (N.). **Field Crickets in Manitoba.**—*Canad. Ent.*, lvii, no. 4, pp. 79–84. Orillia, Ont., April 1925.

The genus *Gryllus* is represented in Manitoba by two races, *G. assimilis pennsylvanicus,* Burm. (spring cricket) and *G. assimilis luctuosus,* Serv. (autumn cricket). The author, however, considers them to be distinct species and gives characters for their separation. Roughly, all adults collected before the 1st July will be *G. pennsylvanicus* and those collected after 1st August *G. luctuosus.* Descriptions are given of the early stages of both species and the life-history and habits are discussed. As a rule, crickets are not very destructive unless they become unusually abundant, when they have been known to attack flax, soft grain, and cabbage plants. Their only useful habit is the digging up and devouring of grasshopper eggs. *Gordius* sp. (hairworms) were the only parasites reared from them. Crows, various small birds, skunks and badgers are all responsible for the destruction of a certain number.

The poison bait recommended consists of 20 lb. bran, 1 lb. arsenic and enough water to moisten thoroughly ; it should be scattered over the infested field in the evening of warm days. Binder twine and other objects subject to injury by crickets and grasshoppers may be protected by smoking them under cover for not less than 48 hours. Poplar sawdust proved effective for making the smoke.

Vuillemin (P.). **A New Fungus Disease of the Satin Moth Larva.**—*Canad. Ent.*, lvii, no. 4, pp. 97–99, 7 figs. Orillia, Ont., April 1925.

A fungus, *Spicaria canadensis,* sp.n., has been found on larvae of *Stilpnotia salicis* in British Columbia.

Atanasoff (D.). **New Studies on Stipple-streak Disease of Potato.**—*Phytopathology,* xv, no. 3, pp. 170–177, 2 figs. Lancaster, Pa., March 1925.

In the artificial inoculation of stipple-streak in potatoes Aphids infected with the disease were used as carriers.

Watson (J. R.) & Beyer (A. H.). **Controlling the Citrus Aphis (*Aphis spiraecola*, Patch).**—*Florida Agric. Expt. Sta.*, Bull. 174, pp. 81–96, 8 figs. Gainesville, Fla., 10th March 1925.

Much of the information in this bulletin regarding the new citrus aphis, *Aphis pomi*, DeG. (*spiraecola*, Patch) has already been noticed [*R.A.E.*, A, xii, 397, 405, 446]. The stage of growth in the tree seems to be the determining factor of infestation; the Aphids cannot live on mature citrus foliage or twigs and many of those born on the hardening foliage develop wings and fly away. As a general rule, the leaves are not attacked after they are two-thirds grown. The commonest form of the alternative food-plant, *Spiraea*, is *S. prunifolia*, which is largely grown in Florida, and on this plant the Aphid can feed on the mature leaves and does not require new growth. Eggs have been observed on this food-plant and also on *Pyrus delutaefolia* and the Japanese flowering quince [*P. japonica*], both the latter being rare in Florida; it is *Spiraea* that enables the insect to live and feed during the winter when there is no new growth on *Citrus*. Growers are strongly urged to destroy *Spiraea* throughout the citrus-growing region. The indications are that this Aphid is spreading over Florida almost entirely by means of flight. Among its enemies is the Australian Coccinellid [*Novius cardinalis*, Muls.], which has never before been known to feed on anything but the cottony cushion scale [*Icerya purchasi*, Mask.]; to what extent it will be valuable in control is not yet known. A Hymenopterous parasite that is commonly found attacking the melon aphis [*A. gossypii*, Glov.] lays its eggs in the new citrus Aphid, and the larva develops and kills the Aphid, but for some reason is unable to emerge, perhaps because the latter does not provide it with sufficient food for complete development.

As soon as growth starts on *Citrus* in spring the trees should be inspected once or twice a week, and in the spots where infestation is discovered, dusting should be done thoroughly; for this purpose a 3 per cent. nicotine sulphate-lime dust is recommended, consisting of 50 lb. of best grade hydrated lime over which is poured 3½ lb. of nicotine sulphate. Calcium cyanide has also been used with success, especially under tents. On very young trees the infested twigs may be dipped by bending them over into a bucket containing any good contact insecticide, such as 1 tablespoonful of nicotine sulphate and a few tablespoonfuls of soap to a bucket of water, or a strong solution of soap only. Infested twigs that cannot be bent over should be cut off and dropped into the insecticide or washed with a sponge. The curled leaves frequently provide shelter for numbers of the purple scale [*Lepidosaphes beckii*, Newm.]; in this case pruning is the only thorough method. When infestation with the Aphid is general throughout a grove, spraying with oil emulsion should be practised early in the season before there is much new growth; but after many blossoms are open and the fruit begins to set, this must be discontinued to avoid scorching the foliage. The possibilities of combining sprays and dusts for various purposes are discussed. As long and as complete a dormant season as is possible is recommended, as the aphis is not known to oviposit on *Citrus*; groves kept dormant throughout the autumn and early winter were exceptionally free from Aphids in the following spring. For a dormancy during the autumn, cultivation should be practised as little as possible after the rainy season, a mowing machine should be used for weeds rather than a harrow, and fertilisation cut down to the minimum, particularly as regards ammonia. When

growth does start in the spring everything should be done to encourage it, using sodium nitrate liberally as a fertiliser. The planting of vegetable crops adjacent to citrus groves is advised, as it increases the numbers of parasites available.

During late spring and summer the average time taken to reach the adult stage was 4 days and in December 6½ days. As the mature female begins to reproduce at once, the periods represent an average generation. The life of females used in the experiments ranged from 3 to 47 days, the reproductive period varying from 2 to 24 days. A single female produced from 8 to 64 young; the percentage of winged individuals produced during the experiments ranged from 45 to 69.

GILL (J. B.). **The Pecan Nut Case-bearer.**—*U.S. Dept. Agric.*, Dept. Bull. 1303, 12 pp., 4 pls. Washington, D.C., April 1925.

A detailed account is given of the life-history and feeding habits of *Acrobasis hebescella*, Hulst (pecan-nut case-bearer), which is regarded as the most formidable enemy of the pecan [*R.A.E.*, A, vi, 226]. Parasites reared by the author from the larvae and pupae include the Tachinid, *Exorista pyste*, Wlk., which is the most effective; *Habrobracon variabilis*, Cushm., *Calliephialtes grapholithae*, Cress., *Cremastus* (*Zaleptopygus*) sp. and *Angitia* sp. The control measures are the same as those previously recommended [*loc. cit.*].

CHAMPLAIN (A. B.), KIRK (H. B.) & KNULL (J. N.). **Notes on Cerambycidae (Coleoptera).**—*Ent. News*, xxxvi, nos. 4 & 5, pp. 105–109 & 139–142. Philadelphia, Pa., April & May 1925.

Notes are given on 48 species of Cerambycids occurring in Canada and the United States, made from original rearings and observations under field conditions.

HOWARD (L. O.). U.S. Bur. Ent. **Parasitic Hymenoptera feeding by Indirect Suction.**—*Ent. News*, xxxvi, no. 5, pp. 129–133. Philadelphia, Pa., May 1925.

This is a discussion of various observations previously published by different investigators, and which have been noticed in this *Review*, regarding the construction of a suction tube made by many parasitic Hymenoptera in order to feed on the body contents of their host enclosed in a cocoon or within the body of another insect. The author has seen unpublished records of similar feeding habits made by several different observers and suggests that such notes should be published.

MCINTIRE (M. H.). **Report of Field Agent, Gypsy Moth Work.**—*21st Rept. Commissioner Agric. Maine, 1922-24*, pp. 48–52. Augusta, Maine, 1924. [Received 8th June 1925.]

In many parts of Maine the situation with regard to gipsy moth [*Porthetria dispar*, L.] remains almost unchanged, probably owing to the fact that egg-clusters above the snow line, after being subjected to a temperature of 25° below zero, will not hatch. Severe spring rains also have a tendency to destroy many larvae. Parasitic work is very promising and will probably become an increasingly important factor. A power sprayer has proved very effective against *P. dispar*

and also against the elm leaf beetle [*Galerucella luteola*, Müll.]. The work of parasite distribution is described, 377,000 *Anastatus* having been liberated during the period covered by this report.

The number of webs of the brown-tail moth [*Nygmia phaeorrhoea*, Don.] found in the spring of 1924 was 50 per cent. above that of the previous season, and in some parts of the State the increase has probably amounted to 100 per cent.

A brief report of the quarantine work against the European corn borer [*Pyrausta nubilalis*, Hb.] is given.

ZIMMERLEY (H. H.), DAVIS (R. J.) & SPENCER (H.). **Spraying and Dusting Cantaloupes.**— *Virginia Truck Expt. Sta.*, Bull. 45, pp. 295–313, 2 figs. Norfolk, Va., 1st October 1923. [Received 27th May 1925.]

In the course of a study of fungous diseases of melons and their control, investigations were made on the insects infesting these crops, which sometimes cause serious losses. *Smynthurus* sp. (spring-tails) cluster on the cotyledons of the plants as soon as they break through the ground, and eat many holes in them. The plants become wilted, distorted and stunted and are sometimes killed. Cucumber beetles (*Diabrotica vittata*, F. and *D. duodecimpunctata*, Oliv.) generally appear at this stage and cause further damage. Neither *Smynthurus* nor *Diabrotica* can be satisfactorily dealt with by means of arsenicals. A number of substances have been tried as repellents, and the following routine treatment is recommended: an application of 200 lb. per acre of dry ground fish scrap should be sown by hand along the row as soon as the first plants appear, and a second application one week later. Treatments of hydrated lime or 3 per cent. nicotine dust should be given at 3 to 5 day intervals, with a hand duster, starting when the first beetles appear, and ending when the plants have several leaves and are large enough to grow satisfactorily in spite of insect pests. If the plants are sown in hotbeds or cold frames the fish scrap may be omitted and the number of subsequent dustings reduced. If infestation by *Diabrotica* is especially severe or early, 3 per cent. nicotine dust should be used in place of lime until the severity of the attack has passed. In 1921, a heavy infestation of *Aphis gossypii*, Glov. (melon aphis) occurred during a prolonged drought in July, but 3 per cent. nicotine dust applied with a power duster at the rate of 40 lb. per acre proved very effective against it. A hand duster is a useful means of applying the nicotine dust to the individual plants at the time when infestation is first noticed.

MCDONNELL (C. C.) & YOUNG (H. D.). **Loss of Nicotine from Nicotine Dusts during Storage.** — *U.S. Dept. Agric.*, Dept. Bull. 1312, 14 pp., 13 figs. Washington, D.C., 27th January 1925. [Received 25th May 1925.]

The following is from the authors' summary of this paper.

The rate of loss of nicotine from nicotine sulphate dusts prepared with kaolin, kieselguhr, talcum, plaster of Paris, calcium hydroxide, and calcium carbonate increases in the order in which the carriers are given. Dusts made with free nicotine solution lose their nicotine much more rapidly than those made with nicotine sulphate. The effect of the carriers, however, is in about the same order in both cases. Canvas bags, pasteboard boxes, and paraffined boxes are unsatisfactory

containers for nicotine dusts. Air-tight metal or glass containers only should be used for packing them commercially. The rapid loss of nicotine from plaster of Paris-nicotine sulphate dusts was no doubt due to the presence of calcium carbonate as an impurity in the plaster of Paris used. Nicotine sulphate solutions became concentrated to about 45·5 per cent. nicotine owing to evaporation when they were exposed to the air at room temperature, but with little or no loss of nicotine. Under the same conditions, solutions of free nicotine lost, in addition to water, from 10 to 17 per cent. of the nicotine originally present, and reached a concentration of 89 per cent. nicotine, which remained unchanged under the conditions of the test.

GILLETTE (C. P.). **Report of the Entomologist.**—*37th Ann. Rept. Colorado Agric. Expt. Sta., 1924*, pp. 26–28. Fort Collins, Colo., 1st December 1924. [Received 25th May 1925.]

The chief investigations undertaken during the year are briefly outlined. Grasshoppers were more troublesome than for several years past, especially on field crops, such as lucerne, maize and wheat. A large quantity of poison bait was used with satisfactory results. *Anabrus simplex* was particularly numerous in some localities. *Epilachna corrupta* (Mexican bean beetle) is spreading and threatens to become one of the most serious pests of beans in some parts of Colorado. *Lepidosaphes ulmi* (oyster shell scale) is very destructive to shade trees in some localities, particularly to ash, cottonwood [*Populus deltoides*], willow and lilac. The Nematode, *Tylenchus dipsaci*, first reported in Colorado in 1923, seems to be widely distributed throughout the State, especially in lucerne-growing regions. It is thought, however, that at present it may be successfully checked by suitable crop rotations, though further investigations are to be made. The alfalfa weevil [*Hypera variabilis*], though present on lucerne in several localities, has not been sufficiently numerous during the past two years to cause great damage, possibly owing to the activities of the parasite, *Bathyplectes curculionis*, which was introduced into the infested area soon after the presence of the weevil became known. *Epitrix cucumeris* (potato flea-beetle) was one of the most important garden pests and was the object of a special study.

PETTIT (R. H.). **The Cherry Maggots.**—*Michigan Agric. Expt. Sta.*, Circ. Bull. 67, 2 pp., 1 fig. East Lansing, Mich., March 1925.

There are two species of cherry fruit-flies in Michigan, the white-banded and the black-bodied cherry fruit-fly [*Rhagoletis cingulata*, Lw., and *R. fausta*, O.S.]. A brief account is given of the life-history and of possible control measures [*R.A.E.*, A, iii, 293]. A lead arsenate spray of 2½ lb. powder to 100 U.S. gals. water is recommended for poisoning the adult flies just before they oviposit.

GUYTON (T. L.) & KNULL (J. N.). **The Apple Maggot or "Railroad Worm."**—*Pennsylvania Dept. Agric.*, Circ. 1, 8 pp., 4 figs. Harrisburg, Pa., January 1925.

Rhagoletis pomonella, Walsh, occurs generally throughout Pennsylvania wherever the chief food-plant, apple, is found. The life-history is briefly described. Clean cultivation is essential in infested orchards, and all self-sown trees that cannot be properly cared for

should be cut down. Spraying must be thoroughly and carefully carried out. A spray schedule of five sprays is recommended, the dormant or delayed dormant spray, the pink spray, the petal fall spray, and one two weeks after and another 10 weeks after the petal fall spray. The last two are the important ones for the control of the apple maggot. In all cases except the first spray the material to be used is $1\frac{1}{4}$ gals. lime-sulphur((32 to 32° Bé.) to 50 gals. water, with $1\frac{1}{2}$ lb. lead arsenate powder to 50 U.S. gals. of spray. For the control of the redbug [*Heterocordylus malinus*, Reut.] nicotine sulphate (40 per cent.) should be added to the petal fall spray at the rate of $\frac{3}{4}$ pt. to 100 gals. spray solution; this may also be added to the delayed dormant spray for the control of Aphids. The dormant or delayed dormant spray should be 1 gal. lime-sulphur to 8 gals. water.

Childs (L.). **Apple Blister-mite and its Control.**—*Oregon Agric. Expt. Sta.*, Sta. Circ. 59, 8 pp., 4 figs. Corvallis, Oregon, February 1925.

Extensive injury to apples in Oregon is caused by mites that appear to be identical with *Eriophyes pyri*, though field observations indicate the possibility of a different species being concerned. It was previously believed that as the green tips unfolded the mites crawled out of the buds and burrowed into the new developing leaves. Observations made in 1924, however, indicate that a large proportion, if not all, of the new infestation results from newly hatched mites from the eggs deposited in the new developing leaves by the overwintering adults. Besides causing galls on the young leaves, the mites burrow into the flower buds and stems, and also attack the young apples, which later become deformed and russety. The possibility of snowberry (*Symphoricarpus racemosus*) being the native food-plant is pointed out; if this is definitely proved, it should be eliminated from orchards wherever practicable. Lime-sulphur, 1 : 10, is the best means of controlling the blister mite; where scale is present it should be applied at the rate of 1 to 8. The spraying must be done thoroughly and before the green tips appear. Where the infestation has not reached serious proportions and other pests are present an oil spray of 8 to 100 is recommended, to be applied after the buds begin to crack slightly and preferably during warm sunny weather. It has not been definitely determined whether an autumn application of lime-sulphur on apples is as effective as in the spring, though it has proved so on pears.

Huber (L. L.) & Neiswander (C. R.). **The European Corn Borer.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, ix, no. 11–12, pp. 192–197, 3 figs. Wooster, Ohio, November-December 1924. [Received 25th May 1925.]

A brief account is given of the investigations regarding *Pyrausta nubilalis*, Hb. (European corn borer) during 1924 in Ohio [*cf. R.A.E.*, A, xiii, 244].

Miller (A. E.). **The Mexican Bean Beetle, *Epilachna corrupta* Muls.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, ix, no. 11–12, pp. 197–204, 3 figs. Wooster, Ohio, November-December 1924. [Received 25th May 1925.]

Epilachna corrupta, Muls. (Mexican bean beetle) is increasing in Ohio both as regards distribution and intensity of infestation. Two

complete generations occur and a partial third; this, however, is unimportant as it causes little injury; only the eggs in the most sheltered positions develop and the adults do not mature sufficiently to resist the winter. Development is normal on all varieties of green, snap, wax, and pole lima beans. Two generations will mature on bush lima beans, but development is slower and mortality amongst the larvae is great. No mature adults were reared on soybeans or cowpeas, though the adults fed voraciously on both plants. The supposed immunity of soybeans therefore requires further proof. In cases of intense infestation it is also possible that lucerne, clovers and vetches may suffer more than anticipated. Adults have been found in the field feeding on the succulent tissue of self-sown peas, though an abundance of succulent bean growth was present. The beetles emerging from hibernation will live for three weeks without food, but must feed before eggs are laid. The natural enemies recorded are *Hippodamia convergens*, Guér., and *Nezara viridula*, L., which destroy the eggs, and *Harpalus pennsylvanicus*, Dej., which feeds on the young larvae.

In applying remedial measures it is most important that the lower surface of the leaves is thoroughly treated. A special system of delivery tubes for dusting is illustrated, designed to cause the dust to rise vertically through the foliage. The dusts recommended are calcium arsenate and sulphur dust 1 part of each to 4 parts of hydrated lime, magnesium arsenate 1 part to 5 of hydrated lime, or lead arsenate 1 part to 9 of hydrated lime. Of the last 18 lb. are required per acre, of the others 15 lb. All these, as well as a proprietary dust, gave equal results as regards yield of beans and killing of the beetle, and all caused slight scorching of lima beans, so that the amounts recommended must not be exceeded. The dusting sulphur may be omitted in the absence of red spider [*Tetranychus telarius*, L.], in which case 5 parts of hydrated lime are used. Four applications at 14 day intervals are usually sufficient, but in areas of heavy infestation 10 day intervals are recommended. The only other remedial measure that promises to be of economic value is the burning of early planted patches that have attracted most of the beetles emerging from hibernation; this method, however, requires further trial.

Sabin (H.). **New Insect Pest Problems in Idaho.**—*Proc. 24th Ann. Meeting Idaho State Hortic. Assoc.*, pp. 16–18. Boise, Idaho, 1924. [Received 6th June 1925.]

Orchard pests of particular note in Idaho at the moment are the snowy tree-cricket [*Oecanthus niveus*, DeG.], which has become one of the most important pests of the prune industry [*cf. R.A.E.*, A, xiii, 50]; spider-mites [*R.A.E.*, A, xi, 11], against which an efficient spray is required that will kill both eggs and mites with one application; and the apple-tree leafhopper [*Empoasca fabae*, Harr.], which is becoming a serious pest.

Melander (A. L.). **How shall we Spray Next Year?**—*Proc. 24th Ann. Meeting Idaho State Hortic. Assoc.*, pp. 102–110. Boise, Idaho, 1924. [Received 6th June 1925.]

The advantages of lubricating oil emulsion sprays over lime-sulphur for the control of various insects are briefly discussed [*cf. R.A.E.*, A, xiii, 82].

YOTHERS (M. A.). **Progress Report on Red Spider Control.**—*Proc. 24th Ann. Meeting Idaho State Hortic. Assoc.*, pp. 111–116. Boise, Idaho, 1924. [Received 6th June 1925.]

Of the various spider-mites occurring in the Pacific Northwest, *Paratetranychus pilosus*, C. & F. (European red spider) is the most important. In comparative tests of lime-sulphur and various proprietary sprays with engine oil emulsion, the latter proved superior, provided that the applications were thoroughly and systematically carried out. Used at the rate of ½ per cent. 91-95 per cent. of the adults and 80 per cent. of the eggs were killed by it, whilst at the rate of 1 per cent. all adults and eggs were killed.

DEAN (M. L.). [**Orchard Pests and their Control.**]—*3rd Biennial Rept. Dept. Agric. State Idaho 1923-1924*, pp. 42–46. Boise, Idaho [1925].

The San José scale [*Aspidiotus perniciosus*, Comst.] has been increasing in Idaho; it may be controlled by oil emulsions, formulae for which are given [*R.A.E.*, A, xiii, 82]. The present infestation by the snowy tree-cricket [*Oecanthus niveus*, DeG.] extends almost throughout the prune-producing sections of the State. The eggs are laid in the autumn in the bark under the larger limbs or in wood of new growth; they hatch in the following June. The immature stages feed on the leaves or on green growth under the trees. As the prunes ripen the adults feed on the fruit, as many as 150 to 500 being found on one tree. During 1924 a lead arsenate spray at the rate of 4 lb. to 200 U.S. gals., or dusting with undiluted calcium arsenate at the rate of about ¼ lb. per tree gave good results.

ALDEN (C. H.). U.S. Bur. Ent. **San José Scale Control with Lubricating Oil Emulsion on Peach Trees in the South.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 253–257. Geneva, N.Y., April 1925.

The author's abstract of this paper is as follows:—

The San José scale, *Aspidiotus perniciosus*, Comst., has been gradually increasing on peach trees in the south in spite of annual dormant treatments with lime-sulphur. During 1922–24, lubricating oil emulsions were compared with the standard lime-sulphur as regards scale control and tree injury. A 2 per cent. lubricating oil emulsion made from either the boiled or cold formulae gave excellent scale control and caused no tree injury, even when twice used in one dormant season. Lime-sulphur gave poor control and caused some twig injury. Trees incrusted and covered with crawlers require two dormant applications of 2 per cent. emulsion for effective control, while under similar conditions lime-sulphur applied twice was ineffective. Late summer treatments with oil emulsions caused premature defoliation and were less effective than winter treatments.

LEONARD (M. D.). **Notes on the Embargo of Grapes from Almeria, Spain, on account of the Mediterranean Fruit-fly** (*Ceratitis capitata*, **Wied.**).—*Jl. Econ. Ent.*, xviii, no. 2, pp. 257–265. Geneva, N.Y., April 1925.

In November 1923, white, so-called Malaga, grapes arriving from Almeria were found to be slightly infested with what appeared to be the larvae of the Mediterranean fruit-fly, *Ceratitis capitata*, Wied. As

soon as the identity of the pest was substantiated, further entry was prohibited by the U.S. Federal Horticultural Board until satisfactory evidence could be presented that such grapes were no longer attacked in Spain by this pest [*R.A.E.*, A, xii, 123]. As it was evident that the embargo would probably continue as long as the fruit-fly continued to exist in the grape-growing districts of Almeria, the author accepted a commission from the New York Fruit Exchange to make a general survey of the local conditions. The topography of the grape-growing sections in the Province of Almeria, methods of culture, food-plants of the fruit-fly and degree of infestation are described. A campaign to combat the pest was organised and the results obtained are outlined. The author, whose rôle was largely that of consulting expert, recommended, amongst other measures, that as grapes were vital to the commercial life of the province and all other food-plants were, in comparison, of small value, these plants, or at least their fruits, should be destroyed with a view to reducing the fruit-flies so that by the time the grapes began to ripen in September there would be little danger of their becoming infested. Part of his programme was carried out, the main modification being in the matter of the wholesale destruction of fruit trees, which the authorities considered unnecessary. Between the latter part of June and early August the fruits infested were peach, apricot, pear, quince, orange and, once only, tomato. The season for these plants was practically over in early August, but later in the month extensive infestation of figs was discovered. The growers suggested that the flies would not leave the figs for grapes, at any rate till October when the figs were over, and therefore asked to be allowed to export to the United States grapes picked in September. Thousands of grapes were examined in all sections from the time they first began to show signs of ripening until 10th September, and none was found to be infested, but the Federal Horticultural Board would not lift the embargo. The grape embargo is closely connected with Spanish-American trade treaty relations, and its probable effect on the renewal of the treaty in 1925 is discussed.

Abbott (W. S.). U.S. Bur. Ent. **A Method of Computing the Effectiveness of an Insecticide.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 265–267. Geneva, N.Y., April 1925.

In computing the effectiveness of insecticides, when an actual count of the living and dead insects in both the treated areas and the controls is available, it is obvious that the insects that die from natural causes must be considered. The Insecticide and Fungicide Board has been carrying on for 5 years a series of experiments against the San José scale, *Aspidiotus perniciosus*, Comst., and in attempting to compare their results, a method of computing what may be termed "the per cent. control" has been developed. The method is based on a line of reasoning which, reduced to a simple formula, would be as follows : — If X represents the percentage living in the control, and Y the percentage living in the treated area, then X–Y would represent the percentage killed by the treatment, and this (X–Y) divided by the percentage living in the control plot (X) and then multiplied by 100 gives the per cent. control. Examples are given, showing how this method works out in actual practice. As the "per cent. control" secured by the use of this formula is no more accurate than the original data on which it is based, it should not be used until the reliability

of the figures for the percentage of dead in the control and treated plots have been carefully considered. This can be done by computing the probable error for each set of counts and then determining the significance of the difference between the two counts. When the difference between the results obtained in the two experiments is more than three times its probable error, the difference is most likely not due to chance but to the treatments applied.

HARTZELL (A.) & LATHROP (F. H.). **An Investigation of Sulfur as an Insecticide.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 267–279, 1 fig. Geneva, N.Y., April 1925.

These investigations on the toxicity of sulphur were conducted on two lines, *viz.* :—Observations of the action of elemental sulphur on soft-bodied insects, on the basis that these are less resistant and therefore more likely to indicate the way in which sulphur kills; and the testing of effects of sulphur compounds on species that are highly resistant to contact sprays because of their natural protection. Experiments with larvae of *Drosophila melanogaster*, Mg., selected as a typical soft-bodied insect, indicated that flowers of sulphur were slightly less toxic than mercury bichloride 1–1,000, but considerably more so than boracic acid. Tests were then carried out to determine the effects of sulphur on Coccids. Although the scales of these insects have been generally regarded as composed of wax, it has been shown that the scales of *Lepidosaphes ulmi*, L., are not soluble in the ordinary solvents of wax [*R.A.E.*, A, v, 165]. Lime-sulphur has the power of softening the newly secreted portion of the covers of *Chrysomphalus aonidum*, L. (*Aspidiotus ficus*, Ashm.), causing the insect to adhere to the bark of the tree, but will not appreciably dissolve the scale covers of *Pseudaonidia* (*Aspidiotus*) *duplex*, Ckll. [*R.A.E.*, A, x, 290], even when they are immersed in the solution for 14 days. In a series of experiments with *Aspidiotus perniciosus*, Comst., the scales were found to be very slightly, if at all, soluble in lime-sulphur and the common wax solvents such as benzene, xylene and turpentine. The volatile products of lime-sulphur were, however, found to produce lethal effects upon this scale, especially the young, without actual contact with the insect.

Three new sulphur insecticides were devised during the progress of this investigation. Carbon bisulphide-sulphur emulsion was prepared as follows :—Five gms. potash fish-oil soap was dissolved in 200 cc. water. In another container 1 gm. flowers of sulphur was dissolved in 250 cc. carbon bisulphide. While the soap solution was being shaken the solution of carbon bisulphide and sulphur was slowly added and the shaking continued until a creamy white emulsion was formed. This stock solution could be diluted to any required strength. Small apple trees heavily infested with *Aphis pomi*, DeG., were sprayed with dilutions ranging from 1 : 10 to 1 : 100. Injury to foliage resulted when concentrations greater than 1 : 20 were applied. At that strength approximately 75 per cent. of the Aphids were killed. To test the effect of adding a small amount of nicotine oleate, 12 cc. of oleic acid and 20 cc. of nicotine were dissolved in 200 cc. of water and then combined with 100 cc. of the stock solution. At a dilution of 1 : 40 the combined emulsion killed 97 per cent. of *Psylla pyri*, L., and no foliage injury was caused to the pear trees sprayed. A weaker dilution (1 : 75) was unsatisfactory. Against *Aspidiotus perniciosus*

the carbon bisulphide-sulphur emulsion (1 : 20) showed a kill of 98 per cent. as against 90 per cent. when lime-sulphur and calcium caseinate was used.

Sulphur naphthalene dust was prepared by dissolving flowers of sulphur in melted naphthalene, then rapidly chilling the solution and grinding the solid thus formed into a dust. As a greenhouse insecticide it proved effective against *Tetranychus* sp. and Aphids. No foliage injury occurred on *Spiraea*.

A colloidal sulphur was prepared by passing sulphur fumes into a dispersion medium such as soap and water or glue and water. Methods for doing this are described. This obviates the necessity of changing the sulphur to some other form and recovering it again by chemical means. In field tests in combination with lead arsenate this preparation compared favourably with other colloidal sulphurs in the control of apple insects (*Cydia pomonella*, L., Aphids, etc.) and apple scab, *Venturia inaequalis*.

HOOD (C. E.). U.S. Bur. Ent. **Fish Oil.—An efficient Adhesive in Arsenate of Lead Sprays, and Results with other Substances used.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 280–281. Geneva, N.Y., April 1925.

As none of the tests made with various substances, such as soap, glue, and molasses, in lead arsenate and other spray solutions to increase their adhesive and spreading qualities, have proved satisfactory, the author conducted further experiments from 1921–24, using high power sprayers and covering large areas. Of all the substances used, the drying oils were the most satisfactory. Although linseed oil was slightly better than fish oil, the latter was selected as it is much cheaper. A lead arsenate spray containing fish oil not only adheres strongly to the foliage on the trees, but also to the vegetation beneath, and livestock, therefore, should not be allowed to graze beneath trees that have been sprayed with it.

MOORE (W.). **Electric Charges of Arsenical Particles.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 282–286. Geneva, N.Y., April 1925.

The common arsenicals, as now manufactured, suspended in water and tested in an electric field, exhibit a negative or no electric charge, and they offer no great resistance to the washing effects of rains or dews. These insecticides may be now so manufactured that they will contain an adsorbed positive ion and exhibit a positive electric charge when wet with rain or dew. Such arsenicals will show great adherence to the negative wet leaf surface, resisting the action of rain or dew [*cf. R.A.E.*, A, x, 313, 424].

Electrostatic charges caused by friction are quite different from the charges present when the particles are wet and due to the presence of ions. With dusts either a positive or negative static electric charge may be acquired as a result of the friction at the time of dusting. This aids in the distribution of the dust particles over the surface of the plant, but will not materially prevent them from being washed away by the action of dew and rain.

The paper was discussed by G. I. Reeves, who pointed out that an arsenical dust, to be effective, must contain an electrifiable (charge retaining) ingredient and that it must be subject to sufficient friction

to produce an electric charge in the course of application, and it should be supplied when the air is dry, without much attention to light winds. Zinc arsenite, Paris green, sulphur and silica, being non-conductors, though they lose the charge residing at the point of contact, retain that at the rest of the surface, and therefore continue to be attracted to the plant and to neutral dust particles. If the non-conducting dust is poisonous it is itself effective; if it is not poisonous it may render poisons of the other class effective. Poisonous conducting dusts, such as calcium arsenate or lead arsenate, discharge completely on contact with a grounded conductor, and are therefore useless unless combined with a non-conducting carrier, conducting carriers, such as hydrated lime, being useless for poisons of the same class.

SANDERS (J. G.). **Miscible Oils and Oil Emulsions.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 287–291. Geneva, N.Y., April 1925.

In consideration of the fact that there are numberless types of so-called engine oils of red, brown, or pale colour with tremendous variation in viscosity, base, gravity and the temperature at which the oil begins to solidify, and in view of the variations in soap compounds and water available, greater caution should be observed in recommending the home preparation of emulsions. Although oils with a paraffin base have been specifically recommended, those with an asphalt base lend themselves more readily to emulsification. The variability of water content and base of fish-oil soaps is discussed, as well as the variations in saponification value. No specification for the oil most desirable can be offered until some careful tests are made with oils of varying types. Certain types of insects or insect eggs appear from records to be more readily killed with oil of rather low viscosity. The eggs of the fruit-tree leaf-roller [*Tortrix argyrospila*] on account of their method of attachment on the twigs and the varnish-like protective covering, are, apparently, more readily controlled with the lighter oils, whereas the eggs of the European red mite [*Paratetranychus pilosus*] and Aphids are more readily killed with a high viscosity oil.

SIEGLER (E. H.) & POPENOE (C. H.). U.S. Bur. Ent. **The Fatty Acids as Contact Insecticides.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 292–299. Geneva, N.Y., April 1925.

This paper, the main observations of which have already been noticed [*R.A.E.*, A, xiii, 183], is intended to present in a general way the results of a single season's work.

MORGAN (A. C.) & MEWBORNE (R. G.). U.S. Bur. Ent. **The Distribution of an Insecticide made Visible.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 299–302. Geneva, N.Y., April 1925.

Uniformity of application of definite quantities of an insecticide is essential in all control experiments. The thoroughness of distribution on individual plants, on different leaves of the same plant and upon specific areas of the same leaf has hitherto been largely a matter of conjecture, or determinable only by analytical methods. The method here described offers an easy and simple means of making such determinations to those for whom the services of a chemist may not be available. It consists primarily in the use of an indicator thoroughly mixed with the dust or spray and the rendering of this indicator

visible on a suitably prepared paper imprint of the treated surface. A mixture of phenolphthalein and lead arsenate was dusted on tobacco and a print of the leaves was taken on filter paper impregnated with an aqueous solution of sodium hydrate. The method, which is described in detail, is applicable to all dusts and also to sprays.

Back (E. A.) & Cotton (R. T.). U.S. Bur. Ent. **A Newly Recommended Fumigant, Ethyl Acetate in Combination with Carbon Tetrachloride.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 302–307. Geneva, N.Y., April 1925.

A fumigant made by mixing 40 parts of ethyl acetate and 60 parts of carbon tetrachloride has been recommended for the treatment of grain in grain cars when used at the rate of 40 to 50 lb. per thousand cu. ft. space, and is non-inflammable and non-explosive under ordinary conditions [*R.A.E.*, A, xiii, 51]. It is simple and pleasant to use, has no injurious effects upon the baking qualities of the wheat and does not affect the viability of seeds. Numerous tests have shown that at ordinary summer temperatures this fumigant is as effective as carbon bisulphide for the treatment of wheat in railway cars. Good results were obtained from experiments conducted to test its efficacy as a fumigant for household purposes, a variety of insects that attack clothing and foodstuffs being placed in airtight containers, and fumigated for 24 hours with different amounts of the fumigant. At the rate of 40 and 50 lb. per 1,000 cu. ft. it was about as effective as 5 lb. carbon bisulphide, but not quite so efficient as 10 lb. of the latter. It has also been successful in the treatment of grain in covered bins, but tests in farmers' cribs indicate that it is not so dependable under conditions satisfactory for the use of carbon bisulphide. The mixture appears to require a more airtight container than carbon bisulphide and possibly a higher minimum temperature. It should be made of pure, or very nearly pure chemicals, as the odoriferous constituents would taint grain and flour. It is more expensive than carbon bisulphide, costing from 6d. to 7½d. per lb.

Simmons (P.) & Ellington (G. W.). U.S. Bur. Ent. **The Causes of Outbreaks of the Angoumois Grain Moth.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 309–320, 2 figs. Geneva, N.Y., April 1925.

Suggestions occasionally made to account for unusual outbreaks of the Angoumois grain moth, *Sitotroga cerealella*, Oliv., include such factors as meteorological conditions, time of harvest, moisture content of wheat, etc. A study of the environment of the moth in the vicinity of Philadelphia during the past 28 years indicates that the principal factor influencing the occurrence of outbreaks is the temperature from June to October.

There have been at least seven outbreaks of *S. cerealella* during the past 28 years in the Philadelphia district, where the agriculture consists typically of a rotation of maize, wheat and hay. As there may be a range of about four weeks between an early and late harvest in the district, this may mean a difference of nearly one in the number of generations that develop in the harvested crop before cold weather begins, and this would have an enormous effect on the ability of the insect to inflict damage. From the evidence at hand, it seems reasonable to suggest that in the absence of considerable above-normal

temperature accumulations from June to October, all other influences favourable to the development of the Angoumois grain moth are incapable of causing an outbreak in the district in question. A high temperature excess during the summer and autumn is very likely to be accompanied by an outbreak, especially if the preceding winter was mild and June and July unusually hot. Early harvests, which are related to hot weather in June, enable the moth to get an early start in the new crop of wheat; late harvests appear to indicate seasons of moderate or light losses from the insect.

Some of the other possible causes of outbreaks are briefly discussed. The amount of control afforded by the use of fumigants, such as carbon bisulphide, has not been of appreciable help in preventing outbreaks, especially as infested stores of grain are not often fumigated.

GRAHAM (S. A.). **Two Dangerous Defoliators of Jack Pine.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 337–343. Geneva, N.Y., April 1925.

The jack pine, *Pinus banksiana*, was formerly thought to be almost immune from insect injury, but has recently suffered from the attack of several defoliators. The pine tussock moth, *Olene leucophaea*, A. & S., caused severe injury to *P. banksiana* in Wisconsin a few years ago, and more recently a sawfly (a new species of *Neodiprion*), and the spruce budworm, *Tortrix* (*Archips*) *fumiferana*, Clem., have appeared in large numbers in certain localities of Minnesota, Michigan, and probably Wisconsin. As a result of repeated defoliation, the trees in the infested localities are beginning to die. Climatic conditions influence the abundance of these pests, but are not of sufficient importance to explain the present outbreak, neither does there appear to be any dearth of parasites and predators. Both insects are quite commonly attacked by entomophagous fungi, and the sawfly is susceptible to a disease similar to the polyhedral disease of Lepidopterous larvae. The area of jack pine forest has been increased tremendously, and this appears to be the probable cause of the present outbreak.

Neodiprion sp. attacks trees of all ages, but appears to prefer the older trees. The eggs are laid in the autumn in slits cut in the edges of the needles, and the larvae hatch in the spring and develop rapidly, reaching the fifth and last stage before the middle of June. They feed only on the old growth. Cocoons are spun in the litter beneath the trees, and a part of the brood emerges and oviposits in September. Some of the larvae, however, fail to pupate the first autumn and pass the winter in the prepupal condition within the cocoons. These overwintering larvae do not emerge until the following September. This characteristic is a very important factor in safeguarding the species.

T. fumiferana also prefers large trees, but only attacks the new growth. The eggs are deposited on the needles in early August. They hatch in a short time and the young larvae hibernate without feeding, emerging the following June. Pupation takes place about the middle of July and the adults emerge in late July and early August.

Recommendations for remedial measures at the present time are purely provisional. Spraying with lead arsenate is effective and is recommended for valuable trees. In forests, natural agencies and forest management must be relied upon. Regulation of felling in favour of other species of trees on suitable sites is recommended in order to produce more balanced conditions in the forest, thereby reducing the chances of serious outbreaks.

MINOTT (C. W.) & GUILD (I. T.). **Some Results of the Defoliation of Trees.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 345–348, 1 pl. Geneva, N.Y., April 1925.

An attempt has been made to gauge the loss in regard to many species of trees in New England defoliated by the gipsy moth, *Porthetria dispar*, L. Individual records have been made covering 10 years (1912-21) for 14,610 trees, of 37 species distributed over an area of about 4,000 square miles in New England, including the district infested by *P. dispar* in 1911. Increment borings were made of 422 trees, from which thin sections were cut for microscopic measurement of annual rings, in order to obtain a more accurate measurement of growth. Defoliation varies in different species, years and localities, according to the food preference of the caterpillars and their abundance. It was observed that of 17 favoured species (8,584 trees) the average defoliation per year was 33·6 per cent.; of 5 species, mostly conifers, not favoured by young larvae, 8·8 per cent.; of 10 species in those partially favoured, 10·2 per cent.; and 4 species in those unfavoured, 1·9 per cent. [*cf. R.A.E.*, A, iii, 668]. In individual trees this percentage varied from 0 to 100 per cent. The fact that young larvae seldom feed on conifers partly explains the low average defoliation for class 2. The average yearly loss is comparatively small except in the favoured food class, but this class comprises a large part of the woodland in the infested region. The loss in growth is more or less proportional to the degree of defoliation. During the period under investigation nearly half the oaks died, and the survivors lost on an average more than a third of their foliage and growth annually, but there is evidently great individual variation in the power of resistance in different trees. Trees that have been checked may or may not recover normal growth, and even if a tree does recover there is still a loss of time in maturing a crop of timber.

MANTER (J. A.). **A Preliminary Report on the Use of Calcium Cyanide for the Mound-building Ant,** *Formica exsectoides*.— *Jl. Econ. Ent.*, xviii, no. 2, pp. 348–350. Geneva, N.Y., April 1925.

In the north-eastern United States it is usual to find areas of from 24 to 36 ft. in diameter cleared around the mounds built by *Formica exsectoides*, on which there is no growth higher than about two feet, and it is not uncommon for a colony of ants to kill from 30 to 40 young evergreens near their nest [*R.A.E.*, A, xi, 201]. Both conifers and deciduous trees may be killed, but the former are more susceptible to injury. Ants have been observed "squirting" formic acid into wounds they had made in the bark. Trees above 8 ft. are not often killed, probably because their thicker bark prevents the formic acid from reaching the living cells. The poisoned bark becomes loosened after a few years and breaks away from the wood. The first evidence of injury to a healthy conifer is gradual yellowing of the needles on the new growth. Calcium cyanide in the granular form has been tested for the control of *F. exsectoides*, with very promising results. The method practised was to make holes in the mounds, as with carbon bisulphide, putting a small amount of the cyanide into each, and filling with soil. Two ounces for an average sized mound appeared to be sufficient. When treated mounds were dug into, some of the galleries were found crowded with the dead bodies of the ants. Cyanide spread on the top of the mound was not effective. The method described is

not expensive. It can be applied quickly, as no special covering of the mound is necessary, and a high temperature is not needed for the production of the gas. With carbon bisulphide an average sized colony requires 1 lb. or more, the mound must be covered, and the method is altogether more costly.

King (J. L.) & Hallock (H. C.). U.S. Bur. Ent. **A Report on certain Parasites of *Popillia japonica*, Newm.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 351–356, 2 figs. Geneva, N.Y., April 1925.

This is a brief account of the work on the introduction of parasites of *Popillia japonica*, Newm. Various consignments of *Craspedonotus tibialis*, Schaum, a predacious Carabid, were received, but although about 50 per cent. arrived in good condition and became established during the summer months, producing eggs and larvae, they were unable to survive. The puparia of *Centeter cinerea*, Ald., a Tachinid parasite, were shipped within the bodies of the dead host beetle, packed in moist sphagnum or moist sawdust, and were successfully established in New Jersey in 1923, and a second colony in Pennsylvania in 1924. The failure of refrigeration shipping methods as used for *Ochromeigenia ormioides*, Town., and the methods of rearing large shipments of a Dexiid parasite, *Prosena siberita*, F., are also discussed. The Tachinid, *Eutrixopsis javana*, Town., was first reared in 1923. It had attacked a number of beetles that bore *Centeter* eggs, and was therefore unintentionally shipped. Of 210 individuals reared, 190 were liberated, but none have been regained in the field. It is unlikely that attempts will be made to introduce this species owing to its scarcity in Japan and the low percentage of parasitism effected by it. Three species of *Tiphia*, *T. popilliavora*, Roh., and *T. vernalis*, Roh., from Korea, and an unidentified species from China were received, and the rearing of the first of these is briefly discussed. Four cocoons of a Scoliid parasite, *Campsomeris annulata*, F., were introduced from Korea in 1923, but no adults emerged, and of 325 cocoons received from the same country in 1924 all material was found to be dead on arrival, owing possibly to the excessive loss of moisture while in transit.

Thomas (C. A.). U.S. Bur. Ent. **Observations on the Life-history of *Popillia japonica*, Newm.**—*Jl. Econ. Ent.*, xviii, no. 2, pp. 357–361. Geneva, N.Y., April 1925.

Field studies on the life-history of the Japanese beetle, *Popillia japonica*, Newm., during the years 1922 to 1924 inclusive, in the vicinity of Riverton, New Jersey, are described. The data obtained on the rainfall, soil and air temperatures during these three seasons have been compared, and the influences of these factors have been correlated with the life-cycle of the beetle. Diggings were made in typical soils of all types over a large part of the territory infested by the beetle. Sandy loams are most favoured for egg laying, and the larvae develop best in them.

P. japonica has a life-cycle of one year in New Jersey, and there is no evidence that it may have a two-year cycle as is the case in northern Japan. The majority of the larvae pass the winter in a dormant condition at an average depth of 9 inches. When the temperature of the soil begins to rise, the larvae move up to a point just below the surface, and enter the prepupal stage towards the end of May, the adult emerging about mid-June. Eggs are laid in the soil throughout the

summer, this stage lasting on an average 11 days, and the first larvae hatch in early July. All larvae have passed through the first instar by late October, and most have reached the third instar.

Data collected during the last three years show that the life-histories during 1922 and 1923 were similar, but that in 1924 the spring and summer stages were from 10 to 14 days later. The mean soil temperatures during the period of development in 1922 and 1923 were also much alike, but were somewhat above the mean temperatures of the same period in 1924. The rainfall in 1923 was considerably below normal, whereas in 1922 and 1924 it was much above normal. Soil temperature is, therefore, probably the most important factor, rainfall, and consequently soil moisture, apparently not being of great influence except as affecting the temperature of the soil.

Leach (B. R.) & Fleming (W. E.). U.S. Bur. Ent. **The Fumigation of " Balled " Nursery Stock.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 362–366, 1 fig. Geneva, N.J., April 1925.

Numerous attempts have been made to fumigate growing plants with soil about their roots for the purpose of destroying insects living in it, but they always resulted in injury to the growth above the soil. Carbon bisulphide, for instance, is very efficacious in penetrating a ball of soil and killing any larvae of *Popillia japonica*, Newm., present therein, but this gas will usually injure that portion of the plant above the soil. The only logical way, therefore, in which stock of this class could be fumigated was believed to be by protecting in some way the upper part of the plant from the action of the gas. The possibility of coating the foliage with a colloidal material was considered, the coating to be removed from the foliage after the fumigation was completed. This idea, however, was reserved for future study, as a quick solution of the problem was imperative, and the method of submerging the foliage part of the plant in water during fumigation was thought likely to offer satisfactory results. As a result of experiment, a closed container has been designed for this purpose. It consists of a tank filled to a certain level with water, leaving an air space above, and the proper mechanism for controlling the water and the toxic gas. The plants are inverted and the foliage portions submerged, while the soil-balls are exposed to the gas. Fumigation tests with this apparatus were carried on for 10 months. Wet soil must be avoided in treatment by fumigation, as the gas will not penetrate mud, and three factors must be considered, namely, the concentration of the gas, the period of fumigation, and the temperature. Within certain limits, unfavourable conditions as regards some one factor can be compensated by more favourable conditions in the others. In the preliminary tests, an arbitrary period of 18 hours was selected for fumigation, and data were obtained on the other two limiting factors of dosage and temperature. It was found that a concentration of 0·1 cc. of liquid carbon bisulphide to a litre [1 part to 10,000 parts per volume] of air space in the chamber was a killing dose within the temperatures encountered. Experiments proved that complete mortality could not be obtained under 8 hours, regardless of the dose employed. Apart from the question of excess moisture no obstacle has been found in respect of the soil. The plants apparently withstand higher concentrations of the gas and longer periods of fumigation than do the larvae of the Japanese beetle. Carbon bisulphide has been found most satisfactory as a fumigant, but relatively high concentrations of this gas have failed to control the egg stage of this insect, so

that the compound must either be fortified with another material more toxic to the eggs, or another compound must be substituted during the season when eggs are present in the soil. The favourable nature of results obtained from the preliminary experiments indicate the advisability of continuing work with a view to adapting the method to treatment of this class of nursery stock on a large scale.

Van Leeuwen (E. R.) & van der Meulen (P. A.). U.S. Bur. Ent. **Coated Arsenate of Lead.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 367. Geneva, N.Y., April 1925.

An abstract only of this paper is published, which is as follows :—

This paper deals with the coating of lead arsenate with a metallic soap and its use against the Japanese beetle (*Popillia japonica*, Newm.). When lead oleate is precipitated under proper conditions, it forms an intimate mixture consisting of globules of lead oleate with uncoated particles of lead arsenate. After drying, the lead oleate spreads upon the surface of the lead arsenate powder and upon the leaf, and produces a coated material, which adheres very firmly to the leaf surface.

Yothers (W. W.). U.S. Bur. Ent. **The Use of Calcium Cyanide Dust against** *Vespula carolina*, **Linn.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 368. Geneva, N.Y., April 1925.

A nest of *Vespula carolina* was located on a spot where a shed was to be erected. A considerable quantity of calcium cyanide dust was placed at the entrance to the nest, but it is not known if any of the dust actually entered the nest itself. All the insects returning from the field were killed practically instantaneously. The nest was excavated an hour and a half later, and it was found that every adult insect, amounting to thousands, had been killed by the gas.

Papers Presented before the Section of Apiculture, December 1923.— *Jl. Econ. Ent.*, xviii, no. 2, pp. 369–410, 2 pls. Geneva, N.Y., April 1925.

The papers read included :—

Are Commercial Honey Shipments largely responsible for the Dissemination of American Foulbrood ? (S. B. Fracker) ; The Moults of the Honey Bee (L. M. Bertholf) ; The New Method of Sterilising Combs affected with American Foulbrood so that they may be used again with perfect Safety (E. R. Root) ; The Honey Bee as an Agent in the Pollination of Pears, Apples and Cranberries (R. Hutson) ; The Status of Isle of Wight Disease in various Countries (E. F. Phillips) —in a note to this paper it is stated that *Acarapis woodi* was not observed in the United States in 1924 ; and the relation of *Bacillus alvei* to the confusing Symptoms in European Foulbrood (A. P. Sturtevant).

Special Reports prepared under the Direction of the Sub-Committee on Insecticides and Appliances, Committee on Policy.— *Jl. Econ. Ent.*, xviii, no. 2, pp. 410–420. Geneva, N.Y., April 1925.

Questionnaires were sent to entomologists in various States and Provinces in the United States and Canada regarding the study of oil emulsions, and the information contained in the replies may be

summarised as follows: The original boiled lubricating oil emulsion formula (oil 1 U.S. gal., potash fish oil soap 1-2 lb., water ½ U.S. gal.) was generally recognised as the most satisfactory. Three kinds of cold-mixed emulsions were tested by many States, and several found them quite satisfactory under certain conditions. These formulae are as follows: Oil 1 U.S. gal., copper sulphate ⅛ lb., hydrated lime ¼ lb., water ½ U.S. gal. Oil 1 U.S. gal., calcium caseinate 2-4 oz., water ½ U.S. gal. Oil 1 U.S. gal., iron sulphate ¼ lb., hydrated lime ¼ lb., water 1 U.S. gal. The miscible oil formula as given by Melander [*R.A.E.*, A, xiii, 82] is said to have yielded the best results in Washington.

In order to prove satisfactory, it was decided that oil must come within the following limits: Viscosity, 90-250 seconds at 100° F. (Saybolt); volatility, less than 2 per cent.; specific gravity, 0·87-0·93 at 20° C. [68° F.]. These were indicated as extreme limits, but it is thought that the best results for scale control may be expected from oil bearing grades within the following limits: Viscosity, 180–220 seconds at 100° F. (Saybolt); volatility, less than 1 per cent.; specific gravity, 0·88 to 0·91 at 20° C.

The general conclusions regarding the relative efficiency of boiled and cold-mixed emulsions were that the two were practically equal, with a slight difference in favour of the boiled, which is generally recognised as the more stable. It is advised that the cold-mixed be made up only as needed. Both are very adhesive and when used with Bordeaux this property is increased, which may prove a disadvantage when applied to fruit. All the emulsions are good spreaders and may be of value when used in summer sprays on apple at 1½ to 2 gals. to the 200 gal. tank. The boiled emulsion mixes satisfactorily with Bordeaux, lead arsenate and nicotine, but not with lime-sulphur. The cold-mixed is compatible with lime-sulphur as well as with the others. The use of a weak (½-½-50) Bordeaux with the emulsions permits satisfactory mixing in most hard waters.

A brief summary of the experiences of a number of investigators as regards the use of the emulsion against various insects is given. Oil emulsions are not generally recommended except as dormant sprays. The exceptions include use as a summer spray where the San José scale, *Aspidiotus perniciosus*, Comst., is serious and has not been sufficiently controlled by the dormant treatment, and against the oyster-shell scale, *Lepidosaphes ulmi*, L. Severe injury to peach has been observed if the emulsion is applied when the trees are in foliage. More or less injury has been reported to apple foliage and fruit from summer sprays, although only slight and insignificant except when the temperature is above 90° F. Many other trees and plants were sprayed with a 2 per cent. emulsion during the growing season without injury, though tomato and potato were badly scorched. As a spreader it can be used safely at the rate of 1½ to 2 gals. to a 200 gal. tank. Cold mixed emulsion costs slightly less than the boiled; the latter is cheaper than any of the commercial preparations, and about half the cost of lime-sulphur.

The status of spreaders in a spray programme is discussed, but no conclusions are given as only fragmentary data are available. Whereas the present, practical value of spreaders to fruit-growers has been over-emphasised, the subject of spreader-adhesives appears to be one of the most fruitful fields of spray investigation.

The results obtained by the experimental use of calcium cyanide in

various parts of the country are briefly reviewed. The use of this poison is considered to be still in the experimental stage. Most of the experimenters report that this insecticide has possibilities of much wider application.

In an attempt to gather information on the subject of insecticide machinery a questionnaire was prepared, and replies have been summarised describing the general type of machinery used, its present trend of development, and suggested improvements; the essential features naturally depending on the nature of the land and the type of crop dealt with.

WOLCOTT (G. N.). **A Termite attacking Seed-cane in Haiti.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 422. Geneva, N.Y., April 1925.

Specimens of *Nasutitermes* (*Tenuirostritermes*) *pallidiceps*, Banks, were taken from seed-cane collected in a field near Port-au-Prince, Haiti. So far as could be determined, this termite builds no external nest in the cane fields, but lives in the ground, feeding on and tunnelling through dead roots of trees, manure and decaying vegetation in general. It attacks seed-cane soon after it is planted if it is slow in germinating, and may leave little more than a shell of the seed by the time the shoot is a foot high. The shoot may die before its roots can become established in the soil, and it is rare to obtain more than a single shoot from a seed. In fields where termites are known to be most abundant, only seed-cane dipped in lead acetate, or with the cut ends protected with tar, should be planted. Injury by this termite was reported as early as 1918, but the species concerned had not been previously identified.

WOLCOTT (G. N.). **A Pyralid-Pyraustinid Larva attacking the Leaves of Sugar-cane in Hispaniola.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 422. Geneva, N.Y., April 1925.

A Pyralid, commonly infesting young sugar-cane in Haiti, has recently been identified as *Marasmia trapezalis*, Guen. A parasite reared from the pupa has been identified as *Spilochalcis* sp. near *flavopicta*, Cress. In Haiti, the larva usually folds over one edge of a single leaf and feeds on the adjacent upper surface, which soon turns a light yellowish-brown. Attacks by this larva on sugar-cane have not been noted in the adjacent islands of Cuba, Jamaica or Porto Rico, whereas characteristic lesions are rather common in most fields of young cane observed in Haiti and San Domingo.

HOERNER (J. L.). **Notes on Codling Moth Larvae.**— *Jl. Econ. Ent.*, xviii, no. 2, pp. 423–424. Geneva, N.Y., April 1925.

Larvae of *Cydia* (*Carpocapsa*) *pomonella*, L., were placed on apples in order to determine how they entered the fruit. All the larvae watched spun webs of silk for a foothold on the apple surface at the point of entrance, those entering roughened places to a less extent than those entering the smooth surface. In entering the apple the larvae did not eat the material cut loose. Whether a foothold of silk is necessary in all cases for the larva to make an entrance is not known, but it appears to be easier for them to enter where two apples are in contact or by the calyx.

DE ONG (E. R.) & KNIGHT (H.). **Emulsifying Agents as an Inhibiting Factor in Oil Sprays.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 424. Geneva, N.Y., April 1925.

Experiments with highly refined lubricating oils as a spray for the red scale, *Chrysomphalus aurantii*, Mask., indicate that their insecticidal value is more a question of their mechanical properties than of any inherent toxicity. Any oil of sufficient viscosity to form a non-volatile film that will retain its consistency for several days appears to be effective. In a series of tests where the oil was kept constant at 2 per cent., while the calcium caseinate, which was used as the emulsifier, was progressively reduced from 2 per cent. to ·0078 per cent., the efficiency was markedly increased as the emulsifier was decreased. In a second series of similar tests the oil was reduced to 1 per cent., and there was still a satisfactory kill with the lowest amounts of calcium caseinate. Further tests were made with fish-oil soap as the emulsifying agent, the oil being kept constant at 4 per cent., while the soap varied from 4 per cent. to 1 per cent. The results showed a progressive increase in kill as the amount of soap was decreased, but there was not a complete kill of the scales when 1 per cent. of soap was used. In soap emulsions, where each droplet of oil is surrounded by a tough, elastic film of soap, it is the latter that comes into direct contact with the insect. This accounts for the fact that it requires four to six times as much oil to obtain results as with an emulsion made with calcium caseinate or lime. In emulsions made with calcium caseinate, if too great a quantity is used it absorbs the oil. When reduced to the minimum (approximately a ratio of casein to oil of ·5 per cent.) the oil is dispersed in large drops, which break down as they pass through the nozzle or on contact with the object sprayed. Crude cottonseed oil as well as petroleum oil was used in this series of experiments and gave equally satisfactory results. From these tests and other evidence it would appear that to secure the greatest insecticidal value from an oil, it should be applied as nearly as possible in the form of a mechanical mixture.

RICHMOND (R. G.). **Wax Moth Parasite.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 425. Geneva, N.Y., April 1925.

Nemeritis canescens, Grav., is recorded as a parasite of the greater wax moth, *Galleria mellonella*, L., in Colorado. The wax moth occurred in considerable numbers in late summer, becoming so severe as to warrant fumigation. Cyanide proved very effective on eggs, larvae, pupae and adults. In spite of apparently perfect control, several living adult parasites were observed at different times throughout the winter months, in a room, and were still emerging in small numbers in March.

YOTHERS (W. W.). **Report on Frost Damage.**— *Jl. Econ. Ent.*, xviii, no. 2, p. 425. Geneva, N.Y., April 1925.

Whereas the loss of citrus foliage from the recent severe cold in U.S.A. was comparatively light, careful examination of the remainder indicates that great mortality was caused to insects. Almost all the adults of the purple scale [*Lepidosaphes beckii*, Newm.] were found to be dead when examined, but most of the scale coverings contained eggs that showed no signs of injury. Very few living Florida red scales [*Chrysomphalus aonidum*, L.] were found, and crawlers present under

the mother scale were also killed. The California red scale [*Chrysomphalus aurantii*, Mask.], like *C. aonidum*, appears to be very susceptible to low temperatures, and the chaff scale [*Parlatoria pergandei*, Comst.] appears to have been almost exterminated. Very few living specimens of the rust mite [*Phyllocoptes oleivorus*, Ashm.] have been observed since the cold, but it is stated that six months after the great frost of 1917, which caused almost complete extermination of this species, reproduction to the extent of billions had taken place.

Contrary to the report that the cotton boll-weevil [*Anthonomous grandis*, Boh.] had been exterminated by the cold, an apparently healthy adult weevil was found, shortly after the frost, hibernating in an orange grove.

Britton (W. E.). **Some of the principal Insects attacking Shade Trees in Connecticut.**—*Connecticut Agric. Expt. Sta.*, Bull. 263 (2nd Rept. Tree Protect. Exam. Board), pp. 156–170. New Haven, Conn., December 1924. [Received 15th May 1925.]

In this account of the chief insect pests of shade trees in Connecticut notes are given as to where additional information regarding them may be found. Formulae for some of the best insecticides for use against them are given.

Richardson (C. H.). **The Oviposition Response of Insects.**—*U.S. Dept. Agric.*, Dept. Bull. 1324, 17 pp. Washington, D.C., April 1925.

The various factors recorded by different observers as stimulating oviposition in insects are reviewed. The simplest oviposition responses are probably shown by insects that spend most of their lives on substances that serve as food for themselves and their offspring. Most free-living insects, however, require a chain of stimuli to provoke egg-laying. Many species demand a specific chain of stimuli. The odour of a substance may attract gravid female insects, but it is probably never in itself sufficient to induce normal oviposition.

Morrison (H.). **Classification of Scale Insects of the Subfamily Ortheziinae.**—*Jl. Agric. Res.*, xxx, no. 2, pp. 97–154, 42 figs., 2 pls. Washington, D.C., 15th January 1925. [Received 2nd June 1925.]

The new species described are : *Orthezia balloui* from Cuba on *Palicourea crocea* ; *O. boliviana* from Bolivia ; *O. mexicana* from Mexico on roots of *Parthenium argentatum* ; *O. minor* from Cuba on *Graffenriedia chrysandra* ; *O. pseudograminis* from the United States on *Sporobolus cryptandrus*, *Deschampsia cespitosa* and *Distichlis spicata* ; *O. tillandsiae* from Florida on *Tillandsia usneoides* ; *Newsteadia americana* from Virginia and Canada ; and *Mixorthezia* (gen. n.) *cubana* from Cuba.

Cleare (L. D., Jr.). **Report of the Biological Division.**—*British Guiana : Rept. Dept. Sci. & Agric. 1923*, pp. 47–51. Georgetown, Demerara, 1925.

In the early part of the year outbreaks of *Metamasius hemipterus*, L. (sugar-cane weevil) occurred in widely separated areas, the quantities

of old and rotten cane left in the fields being apparently largely responsible. A parasite of *Stomatodexia* has been reared, which possibly partly accounts for the scarcity of this Tachinid as compared with other parasites of the moth borers, *Diatraea saccharalis*, F., and *D. canella*, Hmps. Flooding the fields has proved beneficial for the control of *Dyscinetus geminatus*, F. (black hard-back beetle).

Brassolis sophorae, L. (coconut caterpillar) occurred as usual on coconut; its parasites, *Anastatus reduvii*, How., and *Telenomus nigrocoxalis*, Ashm., are recorded for the first time from British Guiana. A Longicorn beetle not yet identified causes serious injury to the egg-plant [*Solanum melongena*], and a Hymenopterous parasite *Ipobracon watertoni*, Cam., has been reared from the larvae. *Ischnaspis longirostris*, Sign., and *Chrysomphalus aonidum*, L. (*ficus*, Ashm.) are recorded for the first time, taken on *Pithecolobium* sp., and roses respectively. The parasites, *Aspidiotiphagus citrinus*, How., and *Aphelinus chrysomphali*, Merc., not previously recorded, were reared from *Aspidiotus destructor*, Sign. The Coccinellid, *Pentilia insidiosa*, Muls., is predacious on this scale.

STAHEL (—). **De koffiebessenboeboek en Suriname.** [The Coffee Berry Borer and Surinam.]—*Meded. Dept. Landbouw, Nijverheid en Handel Suriname*, no. 18, 3 pp. Paramaribo, 22nd January 1925. [Received 29th May 1925.]

This is a account of the occurrence of the coffee-berry borer [*Stephanoderes hampei*] in the Dutch East Indies and Brazil, with notes on its life-history and control. The measures to be taken in Surinam, should it be reported there, are briefly outlined.

STAHEL (—). **Een onschadelijke bessenboeboek** (*Stephanoderes* **spec.**) **van de Liberia-koffie en Suriname.** [A non-injurious Berry Borer (*Stephanoderes* sp.) of Liberia Coffee in Surinam.]—*Meded. Dep. Landbouw, Nijverheid en Handel Suriname*, no. 19, 3 pp. Paramaribo, 23rd February 1925.

A coffee berry boring beetle that has been found in Surinam is not *Stephanoderes hampei*, Ferr., but another species of the same genus [*S. plumeriae*, Norrdl.]. Full morphological details are given. It only infests the black berries, which are not harvested in Surinam, so that it is not of economic importance.

DE TOLEDO RODOVALHO (B.). **O repasse e seus resultados.** [Cleaning up of Coffee Plantations and its Results.]—*Commissão de Estudo e Debellação da Praga Caféeira*, Publ. no. 9, 32 pp., 20 pls. S. Paulo, 1925.

This is a description of the method, now advised in Brazil, for combating the coffee-berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.) by carefully removing all fallen berries from the ground after the harvest. The ground must be raked over and all rubbish assembled in heaps and buried. Fissures in rocks are likely to harbour berries dropped into them, and must be filled in with earth. When a plot has been cleared it must be enclosed in a ridge of earth to prevent rain-water from carrying into it infested material from adjoining ones.

Lei, Decreto e Regulamento. [The Law, Decree and Regulations passed in the State of S. Paulo against the Coffee Berry Borer.]—*Commissão de Estudo e Debellação da Praga Caféeira*, Publ. no 10, 26 pp. S. Paulo, 1925.

The texts are given of the law no. 2,020 of 26th December 1924, and of the decree no. 3,816 of 6th March 1925, together with the regulations attached to it. This legislation is directed against the coffee-berry borer [*Stephanoderes hampei*, Ferr.] and renders compulsory the recommendations that have been made against this pest in S. Paulo, and which have already been noticed from various publications.

RUTTLEDGE (W.). **Note on the Occurrence of a Mermithid Worm in the Body of a Termite,** *Cornitermes orthocephalus*, **Silvestri.**—*Parasitology*, xvii, no. 2, pp. 187–188, 2 figs. Cambridge, May 1925.

Mermis sp. has been found parasitising a variety of *Cornitermes orthocephalus*, Silv., in Brazil, without apparently affecting its host.

BONDAR (G.). *Pilocrocis infuscalis*, **Guen., inimigo do fumo.** [*P. infuscalis*, a Pest of Tobacco.]—*Correio-agric.*, iii, no. 4, pp. 102–103, 3 figs. Bahia, April 1925.

The Pyralid, *Pilocrocis infuscalis*, Guen., is an important pest of tobacco in the Brazilian State of Bahia. The eggs are laid on the leaves, and the larvae feed on them. Larval development takes about a fortnight, and the pupal stage lasts 11-15 days. *P. infuscalis* is common in May, June and July. Under the local conditions the best remedy is collection of the larvae.

DE AZEVEDO (A.). **A praga do café.** [The Coffee Pest.]—*Correio-agric.*, iii, no. 4, pp. 103–104. Bahia, April 1925.

With reference to the occurrence of the coffee-berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.) in S. Paulo, it is stated that postal packets sent from France containing coffee seed from W. Africa have been found to be infested with this pest.

DE AZEVEDO (A.). **Uma praga das roseiras e outras plantas na Bahia.** [A Pest of Roses and other Plants in Bahia.]—*Correio-agric.*, iii, no. 4, pp. 105–108, 2 figs. Bahia, April 1925.

The Coccid, *Icerya purchasi*, Mask., has been observed in the State of Bahia on rose, *Acacia*, *Ficus* and other plants, and may occur on *Citrus*, though it has not yet been reported on it. A brief account is given of usual remedial measures, including the use of *Novius cardinalis*, Muls., which is already being bred by the authorities in S. Paulo.

Work in Connexion with Insect and Fungus Pests and their Control.—*Repts. Agric. Dept. Antigua, 1921-22 & 1922-23*, pp. 9–10 & 7–8. Barbados, 1922 & 1924. [Received 8th June 1925.]

Lachnosterna antiguae (brown hard-back beetle) was observed in large numbers in certain sugar-cane fields. The parasite of this

beetle, *Tiphia parallela*, has also been observed, and is being encouraged by the planting of *Cordia interrupta*, at which the adults feed. *Diatraea saccharalis* and *Metamasius* (*Sphenophorus*) *sericeus* occurred in most sugar-cane fields, though no great damage is attributed to them. A slight attack of *Alabama argillacea* in cotton fields was checked by dusting with Paris green and lime. *Dysdercus andreae* was controlled by setting traps of cotton seed and collecting by hand. *Eriophyes gossypii* (cotton-leaf blister mite) was less abundant than in 1920. During 1921 *Platyedra gossypiella* (pink bollworm) was recorded for the first time from Antigua and spread rapidly. Fumigation in the ginneries and legislative measures greatly reduced its occurrence in 1922. *Lepidosaphes beckii* (purple scale), *Chionaspis citri* (orange snow scale), and *Coccus viridis* (green scale) are recorded from limes. *Euscepes* (*Cryptorrhynchus*) *batatae* was observed on sweet potatoes. Badly infested areas were covered with cane trash and burnt over.

Ehrhorn (E. M.). **Reports of the Chief Plant Inspector, December 1924 and January 1925.**—*Hawaiian Forester & Agriculturist*, xxii, no. 1, pp. 18–21. Honolulu, January-March 1925.

The pests intercepted in December 1924 and January 1925 included: From Australia, *Aspidiotus rapax* and Lepidopterous larvae on a myrtle plant; from California, *Orthezia insignis*, *Pseudococcus citri* and *Coccus hesperidum* on ornamentals; from China, *Cremastogaster* sp. in dry herbs; from Japan, *Librador* (*Ips*) *japonicus*, *Allecula fuliginosa*, *Camponotus* sp., *Cremastogaster laboriosa*, and Lepidopterous and Coleopterous larvae in *Paulownia* logs, and bagworms in bamboo brooms.

Simmonds (H. W.). **Tobacco Disease.**—*Agric. Circ. Dept. Agric. Fiji*, iv, no. 1, pp. 4–5. Suva, January-June 1923. [Received 26th January 1925.]

Phthorimaea heliopa [*R.A.E.*, A, x, 593] is now recorded from Bua province. All tobacco plants should be destroyed, preferably by fire, after gathering the crop. When the seed beds have been established, all young infested plants should be pulled up and destroyed. In the vigorous plants the larva may be exposed and killed by making a longitudinal cut in the swollen part of the plant with a sharp thin-bladed knife. Seedlings kept for a long time in the seed bed are severely attacked; they should be transplanted when about 6 inches high and all the shoots at the base of the plant and on the axils of the leaves removed.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiii, pt. 4, pp. 268–269. Brisbane, 1st April 1925.

In addition to *Rhyparida morosa*, recently recorded as a pest of sugar-cane, another Chrysomelid has just been bred from larvae at Proserpine, Queensland; it is probably kept well in check in normal years by various parasites. The lesser flying opossum (*Pelaurus breviceps*) has been observed to catch and devour the beetles, *Lepidoderma albohirtum* and *Lepidiota frenchi*.

Bates (G.). **An Entomological Survey.**—*Queensland Agric. Jl.*, xxiii, pt. 4, pp. 269–271. Brisbane, 1st April 1925.

In the course of an entomological survey at Proserpine, Queensland, besides the more usual soil-infesting grubs, *Anoplognathus boisduvali*, Boisd., *Gnathaphanus pulcher*, Dej., and *Xylotrupes australicus*, Thomp., were observed. Among beetles taken in the adult stage were *Anomala australasiae*, Blackb., and *Calloodes rayneri*, Macl. *Pentodon australis*, Blackb., which was injurious to sugar-cane sets in the previous year, was not observed.

In the Ayr district, where the termite, *Mastotermes darwiniensis*, Frogg., causes much damage, on one estate all posts, etc., harbouring this pest have been treated with a mixture of one part arsenic to six parts of molasses, by measure, with good results.

Cottrell-Dormer (W.). **Cane Diseases and Pests.**—*Queensland Agric. Jl.*, xxiii, pt. 4, pp. 271–272. Brisbane, 1st April 1925.

Mosaic disease of sugar-cane is very prevalent in the Proserpine district of Queensland, being doubtless transmitted by Aphids. The larvae of a small Chrysomelid were very destructive to cane planted during late July and August, especially damaging the sets and young shoots. During December the adults seem to depend for their food on she oaks [*Casuarina*], the leaves of which they eat eagerly, and damage was only noticed in localities where this tree occurs. The destruction of this food-plant is not, however, recommended at present; growers should protect their plants with small applications of carbon bisulphide and paradichlorobenzene.

Jarvis (E.). **Entomological Hints to Canegrowers.**—*Queensland Agric. Jl.*, xxiii, pt. 4, pp. 273–275, 2 figs. Brisbane, 1st April 1925.

A popular description is given of the beneficial insects found in soil, which should not be destroyed.

Jarvis (H.). **Apple Tree Woolly Aphis and its Subjugation by *Aphelinus mali*, Hald.**—*Queensland Agric. Jl.*, xxiii, pt. 4, pp. 314–316. Brisbane, 1st April 1925.

The introduction and establishment of *Aphelinus mali*, Hald., into Queensland for the control of the woolly apple aphis [*Eriosoma lanigerum*, Hausm.] is described. The success of the parasite has been remarkable, and it has been found at distances as far as three miles from the points of liberation. As the parasite seems to attack any dark-coloured Aphid, it is hoped to use it effectively against other species, especially those that are troublesome on *Citrus* and banana.

Newman (L. J.). **Blastophaga Fig Wasp** (*Blastophaga grossorum.*).—*Jl. Dept. Agric. W. Australia*, ii (2nd Ser.), no. 1, pp. 46–48, 5 figs. Perth, March 1925.

A brief account is given of experiments with *Blastophaga grossorum*, which has been successfully established for the purpose of fertilising Smyrna figs; these show that it is also capable of effecting caprification and consequent fertilisation in varieties of figs that, in its absence, ripen an edible fruit without producing fertile seeds.

Newman (L. J.). **Fruit Fly Bait. Warning.**—*Jl. Dept. Agric. W. Australia*, ii (2nd Ser.), no. 1, p. 49. Perth, March 1925.

The substitution by some fruit growers of the dry or powdered form of lead arsenate for the paste, using the same weight, has rendered useless the bait-spray and trap bait formulae for fruit-flies [*R.A.E.*, A, ix, 260 ; xii, 411], owing to the fact that it is too strong in poison content. In common practice it is recognised that powdered lead arsenate is twice as strong as the paste form. With the overdose of poison the fruit-fly [*Ceratitis capitata*, Wied.] does not refuse the bait, but fails to retain it, owing to its emetic properties.

Clark (J.). **Forest Pests. The Pin-hole borer** (*Atractocerus kreuslerae*, **Pasc.**).—*Jl. Dept. Agric. W. Australia*, ii (2nd Ser.), no. 1, pp. 138–142, 2 figs. Perth, March 1925.

Although well known in the larval stage, the imago of the Lymexylonid beetle, *Atractocerus kreuslerae*, Pasc., has only recently been discovered. Experiments are now being conducted with a view to ascertaining the exact length of time taken to reach maturity from the egg, and for this purpose fertile females have been imprisoned in traps on trees. The eggs are deposited on the bare, injured timber of the tree, generally on the seat of an old blaze mark, or where limbs have been torn off. Almost any species of *Eucalyptus* in the bush with a portion of the trunk injured is liable to attack, some of those most favoured being *E. patens*, *E. gomphocephala* (tuart), and *E. marginata* (jarrah). In the case of tuart the beetle is frequently found working in old stumps and old logs lying on the ground, though this is not usually the case with other trees.

The larvae bore for a considerable distance into the tree, mostly in a horizontal direction, and as they progress they continually push out a long thread-like core, which usually projects about an inch from the burrow, eventually breaking off and accumulating in a heap at the base of the tree or the injured portion. When full-grown the larva appears to turn in the burrow and work back to the entrance, pupating near the surface, usually from a quarter to half an inch from it. The actual time passed by the larva in the tree is not definitely known, but is at least two years. No parasites have been observed, but the larva appears to be liable to the attacks of a fungus. The adult beetle flies to the top of the tree immediately it emerges.

Marshall (G. A. K.). **New Curculionidae attacking Trees in India.**—*Bull. Ent. Res.*, xv, pt. 4, pp. 339–344, 1 pl. London, April 1925.

The species described are : *Corigetus instabilis*, from Bombay, defoliating trees of *Casuarina equisetifolia* ; *Magdalis himalayana* from the United Provinces (the first species of this genus recorded from India), bred from *Pinus longifolia* ; *Camptorrhinus mangiferae* from Bihar and Orissa, bred from mango tree (*Mangifera indica*) ; *Phylaitis pterospermi* from the United Provinces, bred from wood of *Pterospermum acerifolium* ; and *P. scutellaris* from the United Provinces, bred from *Eugenia jambolana* and *Acacia pennata*, and from Bombay bred from *Cassia auriculata*.

Morris (H. M.). **Note on the Wheat Bulb Fly** (*Leptohylemyia coarctata*, **Fall.**).—*Bull. Ent. Res.*, xv, pt. 4, pp. 359–360, 1 fig. London, April 1925.

In addition to winter wheat, *Hylemyia* (*Leptohylemyia*) *coarctata*, Fall. (wheat bulb fly) may attack winter barley and winter rye, though such injury is rare in England. The life-history is briefly described [*R.A.E.*, A, ix, 321; x, 366]. This species is remarkable among phytophagous insects in that it lays eggs in the bare soil in the absence of its food-plant. Observations at Rothamsted between October 1923 and January 1924 confirm those previously made [*loc. cit.*]. In a 9 inch cube of soil 30 eggs were found, giving a distribution of approximately 166,000 per acre. The egg and the emergence of the larva are described.

Laing (F.). **Descriptions of two Species of Coccidae Feeding on Roots of Coffee.**—*Bull. Ent. Res.*, xv, pt. 4, pp. 383–384, 2 figs. London, April 1925.

Ortheziopa reynei, gen. et sp. n., and *Rhizoecus coffeae*, sp. n., are described from Dutch Guiana.

Waterston (J.). **On some Eulophid Parasites (Hym., Chalcidoidea) of the Oil Palm Hispid Beetle.**—*Bull. Ent. Res.*, xv, pt. 4, pp. 385–395, 6 figs. London, April 1925.

The parasites described were bred from the Hispid, *Coelaenomenodera elaeidis*, Maul., attacking oil palms in West Africa, and comprised *Dimmockia aburiana*, sp. n., *Cotterellia podagrica*, gen. et sp. n., *Closterocerus africanus*, sp. n., and *Achrysocharis leptocerus*, sp. n. Besides these a number of hyperparasites of the genus *Pleurotropis* were reared from *C. podagrica* and *D. aburiana*. Those attacking *C. podagrica* were all *P. nigripes*, Wtrst., as were most of those attacking *D. aburiana*.

Symes (C. B.). **The Black Maize Beetle** (*Heteronychus licas*, **Klug**). **Observations on Life History and Control.**—*Rhodesia Agric. Jl.*, xxii, nos. 1 & 2, pp. 83–98 & 207–224, 1 pl., 3 figs., 5 tables; also as [*Southern Rhodesia*] *Minist. Agric. & Lands*, Bull. 535, 35 pp., 1 pl., 3 figs., 5 tables. Salisbury, February & April 1925.

Heteronychus licas, Klug (*mashunus*, Pér.), the life-history of which has already been noticed [*R.A.E.*, A, vi, 239], is an important pest of maize in several districts of Southern Rhodesia, sometimes in association with other species of the genus [*cf. R.A.E.*, A, xii, 264], and is likely, under certain conditions, to constitute a very serious menace to the maize-growing industry. Its permanent breeding grounds are the damp, black soils found in vlei areas, and it is only during or after an excessively wet season that the higher lands become damp enough for breeding. The female deposits 60 to 70 eggs at the roots of grass or maize, and hatching occurs in 17–25 days. This period may be prolonged considerably by cold weather. Oviposition usually continues from the end of December to the end of March. Eggs cannot endure long periods of drought or submersion in water, though they retain their vitality in soil that appears to be almost saturated. The larvae feed on dead vegetable matter and grass roots, but they also thrive well on common soil humus and especially on kraal manure.

Feeding continues for about 57 to 70 days. The pupal stage lasts 3 or 4 weeks and occurs at the end of September or beginning of October. It is the newly-emerged adults that are the main cause of the damage to crops. So far as is known, only Graminaceous plants are attacked, all other crops being immune, and it is probable that a feed of green food is essential before oviposition can begin. The normal life of the adults is from November until April. Considerable powers of flight are possessed by *H. licas*, and the attraction to light appears to be quite strong, though it is probable that it only operates over a relatively small area. Natural enemies, of which birds are probably the most important, destroy a large number of eggs, larvae and adults, but the control they exercise is negligible during abnormally wet years.

The most satisfactory remedial measures are mainly cultural. The fields should be thoroughly ploughed as soon as possible after the last crop and as frequently as possible during the winter. The later planting of maize should be determined by local conditions, with special attention to rainfall, but is of no value unless the land is kept entirely free from grass and weeds during late October and November. Drainage of vlei areas is essential if the low-lying, damp, permanent breeding grounds are to be eliminated. Other measures are the rotation of crops, the running of pigs on vlei lands during winter, the use of fertilisers to produce vigorous growth, and hand collection of the adults. The latter can be carried out quite economically and, besides checking damage to crops, is a very certain method of reducing the risks for following seasons.

Departmental Activities : Entomology.—*Jl. Dept. Agric. Union S. Africa*, x, no. 5, pp. 379–381. Pretoria, May 1925.

Lema bilineata is recorded for the first time on tobacco in the Barberton district. *Nysius binotatus* occurred in very large numbers in the Western Province, constituting for the time being a household pest by invading houses, as did also larvae of *Bombycomorpha pallida*, which is a pest of pepper trees [*Schinus molle*]. Larvae of the Saturniid, *Bunaea alcinoe*, were found to be infested with a Nematode measuring from 26 to 40 inches in length. The eucalyptus snout beetle [*Gonipterus scutellatus*] is continually being recorded from fresh localities. *Chrysomphalus rossi* was intercepted on *Eucalyptus* from Australia.

Investigation Work of the Elsenburg School of Agriculture, Mulder's Vlei. Entomology.—*Jl. Dept. Agric. Union S. Africa*, x, no. 5, p. 440. Pretoria, May 1925.

The results of experiments show that one late winter application of commercial lime-sulphur of about 4° Bé. will not satisfactorily control red scale [*Chrysomphalus aurantii*, Mask.] if trees are considerably infested ; one application of miscible oil, diluted 1 in 15, will be effective, but it is more expensive than lime-sulphur ; one late winter spray of lime-sulphur, diluted 1 in 10, followed by two foliage sprays, diluted 1 in 50, or 1° Bé., applied respectively when the flower buds are green and pink, will also control the scale. These foliage sprays, applied before blossoming, will cause little scorching and are efficient substitutes for Bordeaux in fungus control. One late winter spray of lime-sulphur, diluted 1 in 10 (4° Bé.), followed by three foliage sprays, diluted 1 in 50, the first to be applied when the buds

are green or pink, and the other two, with lead arsenate added for the control of the codling moth [*Cydia pomonella*, L.], applied after the petals have dropped, will effectively control the scale, mites and fungi, but the last two sprays sometimes cause considerable scorching.

WILKINSON (H.). **The Coffee Bug** (*Antestia lineaticollis*, **Stål, var.**).—*Uganda Protectorate Dept. Agric.*, Circ. 13, 35 pp. Kampala, 1924. [Received 25th May 1925.]

Some of this information regarding *Antestia lineaticollis*, Stål, has already been noticed [*R.A.E.*, A, xii, 264]. There are two chief types of damage caused to coffee by this bug, namely, malformed and spotted or chipped beans, particularly noticeable if the berries are attacked when very young so that only small and shrivelled beans are formed, and the production of masses of leaves and branches with short internodes, which bear little, if any, crop. Although the bug may prevent a certain number of flowers from setting, or may cause small berries to fall, the loss from these causes is comparatively negligible. Experiments are described indicating that the real causes of berry-fall are chiefly physiological. The author did not observe any predacious enemies of the bug. The adults are parasitised by the Tachinid, *Epineura rubens*, Vill., but in view of the small percentage of parasitism and the fact that the adult bug remains active until the parasite emerges this fly is of minor value. Two important egg parasites are the Scelionids, *Hadronotus antestiae*, Dodd, and *Telenomus truncativentris*, Dodd. Their value could be greatly increased by ensuring their presence in the early stages of attack by *A. lineaticollis*; all eggs observed in the field should be collected and kept in shallow boxes to allow the escape of the largest number of parasites.

Artificial control is a difficult problem, all stages of the insect being present on the bushes on practically every day of the year. The author considers large-scale spraying quite impracticable under existing circumstances in East Africa, but regards smoking as the best remedy as yet known. Many local methods have been tried; that considered best consists of an ordinary four-gallon petrol tin cut in two lengthwise. Through the middle of each long side a wire loop is fixed; a small forked branch is then cut and the forked part put through the wire loops, the straight part serving as a handle to carry the tin on the fork. In the bottom of the tin are placed burning chips of wood and the tin is filled with moist cow-dung. The contents smoulder, giving off a white smoke that can be directed to any part of the tree by moving the tin as required, and will last all day. The heat given off is so slight that the foliage is not scorched unless the tin is brought almost into contact with it. The cost is only that of the labour; one man generally carries the tin while one or two collect all the bugs, which run to the centre of the bush and down the main stem as soon as the smoke is applied. It was found that 100 acres of coffee could be smoked at least 4 times a year at a cost of a little over £100, and as a rule it is not necessary to smoke all the trees, so that the cost should be considerably less. The smoking should be done before 8 a.m. or after 4.30 p.m., as in bright sunshine the bugs tend to fly away when smoke is applied. Various other methods of smoking are discussed, but these have not been tried sufficiently to give any definite results; it is hoped eventually to find some smoke that will kill the insects, thus rendering collection unnecessary.

The author is convinced of the necessity for shade if *Coffea arabica* is to be grown under the best conditions in Uganda. Evidence generally indicates that coffee grown under shade is less infested than that grown in the open, and it is significant that *Antestia* seems never to have been recorded on wild coffee, the natural habitat of which is the depths of the forest, although the bug is apparently indigenous. Further experiments on the effect of supplying potash directly to coffee bushes show different results from previous ones [*loc. cit.*]; plants growing in solutions of a high ratio of potash to phosphorus were attacked by the bug. Preliminary manurial experiments are described, which indicated negative results, but have not yet been sufficiently tried for definite conclusions to be drawn. The factors of rainfall, degree of wetness and temperature as influencing the occurrence of *A. lineaticollis* are not yet fully understood, but a number of records in this connection are given for the benefit of other workers, and it is thought that there is some indication that if over a period of a few months the rainfall is much below normal, it may be followed by an attack of the bug.

WEBSTER (J. F.). [**Report.**]—*Mthly. Agric. Bull. Iraq, 16th March-15th April 1925,* 2 pp. Baghdad, 21st April 1925.

The locust situation has been rendered serious owing to the backward condition of the crops, and harvesting will be impossible before the locusts are on the wing. Every effort is being made to deal with the hoppers by trenching and burying, the use of crude oil, nets, etc., but large swarms are bound to reach the adult stage and, once on the wing, will be able to reach the cultivated areas. Fortunately, the scarcity of desert grasses has caused heavy mortality among them; but, owing to the lateness of the winter crops, the survivors will be able to do an unusual amount of damage.

WEBSTER (J. F.). [**Report.**]—*Mthly. Agric. Bull. Iraq, 16th April-15th May 1925,* 2 pp. Baghdad, 20th May 1925.

The energetic campaign against locusts has on the whole given very satisfactory results. It is considered that locusts on the left bank of the Tigris from Mosul downwards can now be successfully dealt with, but the problem of the right bank is much more difficult, as there is no population to deal with them. Locusts hatched there will always be a menace to the cultivated areas on the left bank, and in years of late harvest will be capable of doing enormous damage. In April, a high wind carrying a dense dust caused operations to be suspended for a day, after which it was found that large swarms of hoppers had totally disappeared and were never again found. In other places equally bad weather conditions merely resulted in driving the locusts to the ground until conditions improved. The bug [*Eurygaster integriceps*], which is a pest of sunn [*Crotalaria juncea*] and winter cereals, probably does even more damage than locusts. Eggs are laid for preference on the lower surface of the leaves of weeds rather than on wheat and barley, and if the weeds are removed after oviposition, a large measure of control is effected. If, however, weeding is done before the eggs are laid, they will be laid on wheat or barley. The nymph reaches maturity only just before wheat harvest. Barley, which is harvested earlier, cannot carry the pest to maturity; if,

therefore, a slightly earlier wheat could be found the pest would be controlled. A few parasites have been discovered and are being studied.

RICHARDS (P. B.). **The Control of Cotton Pests in North India.**— *Agric. Jl. India*, xix, pt. 6, pp. 568–578, 2 pls. Calcutta, November 1924. [Received 18th May 1925.]

The spotted bollworms, *Earias fabia*, Stoll, *E. insulana*, Boisd., and *E. cupreoviridis*, Wlk., are responsible for large losses to the cotton crop in northern India, the damage in the Punjab in some years being estimated at several million pounds sterling. An account of the life-history and habits of these moths is given [*R.A.E.*, A, xii, 90, 266]. The bollworms first attack the young seedlings, then the flower-buds, flowers and young bolls, and finally those of the later generations eat their way into well-developed bolls, devour the seeds and thus destroy the lint. It is probably the damage to these larger bolls that is of the greatest importance to yield and quality. None of the three species is confined to cotton, and on emergence in the spring they can usually begin breeding on *Hibiscus esculentus*, *Abutilon indicum* and other food-plants.

A far more injurious and dangerous pest is *Platyedra gossypiella*, Saund. (pink bollworm), of which the moths appear in northern India about 3-4 weeks after the cotton is planted, oviposition beginning with the development of the buds and flowers. The young larva hatches in 3-10 days, and immediately eats a way into bud, flower or boll. Once inside a flower or one of the older bolls, it remains there until ready to pupate. This larva, unlike that of the spotted bollworms, does not leave any trace of its entrance into a boll. Pupation occurs inside a cocoon within the hollowed seed, or among the lint, bracts or withered leaves, or sometimes on the stem or in cracks in the soil. In 10-14 days the adult emerges. A complete generation, in which the insects may increase one to two hundred fold, occupies from 25 to 30 days in the monsoon, and four generations between July and October frequently result in practically every boll being infested. Towards the end of October the larvae enter a resting period within the seeds, remaining quiescent through the cold weather and the heat, and awaking to activity again only after the onset of the monsoon. A few exceptional individuals pupate and the emerging moths oviposit on such cotton plants as may be available. The resulting larvae develop very slowly in the cold weather, but under favourable conditions two generations may be completed during the winter, and, if cotton is left in the ground during the hot weather, two more generations may occur. The numbers are limited by scarcity of food, but are sufficient to require consideration in planning remedial measures. Most of the long-cycle larvae pass through the ginning process uninjured and remain dormant until they are sown with the seed. The author's estimate of the damage done by this species in the United Provinces is the loss of about 25 per cent. of the crop by the destruction of buds, flowers, young bolls and lint. It is when the larva is resting, during the off-season, within the hollow seeds, that the pest can best be attacked. It is known that by heating the seed to a certain temperature the larvae can be killed without injuring the seed, and this can be done at the ginneries. To be of much use, however, this treatment should be universal throughout North India, and before this can be attempted further investigations are required and are being undertaken.

KLEINE (R.). **On some Indian Brenthidae (Coleoptera). Part I. Neue Brenthiden aus Britisch Indien und den anliegenden Gebieten.** [New Brenthids from British India and the neighouring Regions.]—*Indian Forest Records*, xi, no. 4, pp. [124]–[170], 2 pls. Calcutta, 1925.

The new genera and species of BRENTHIDAE described in this paper are from material from British India and the neighbouring region in the British Museum and Indian Museum. A key to the subfamilies and genera of the Indian region is given.

BEESON (C. F. C.). **On Some Indian Brenthidae (Coleoptera). Part II. Notes on the Biology of the Brenthidae.**—*Indian Forest Records*, xi, pt. 4, pp. [171]–[188], 1 pl. Calcutta, 1925.

The Brenthids have been divided into two groups by Kleine, the phytophagous and myrmecophilous, the latter containing only a few forms. He considers their capability for damage to be only secondary, and that in the case of healthy trees their development appears to take place only in the cambium. The author's observations, however, suggest that the Indian species, at any rate, are true wood-borers, and not bark-borers in the larval stage, and that their habitat is normally in felled or fallen timber, and not in living trees. Adult beetles occur gregariously between the bark and wood of trees that have been attacked by bark- and sapwood-boring larvae (mainly Longicorns). They often hibernate under dead bark, but may be found in most months of the year. The eggs are apparently deposited singly on the surface of the sapwood under the shelter of the wood dust and fibres in the excavations of surface borers. In some genera the female bores a hole in the wood, in which the egg is placed. The larva constructs its own gallery, radially into the wood, and feeds like the Lymexylonids and Platypodids on sap and saprophytic fungi growing in the gallery. Pupation usually occurs in a cell along the axis of the tunnel. Sometimes the tunnels of other wood-borers may be used and the original occupant ejected. As the life-cycle progresses concurrently with those of primary wood-borers, beetles of this family should be classed among the borers of freshly felled or fallen timber, rather than among those groups that establish themselves after the timber has lost a high proportion of its moisture, and has begun to decay. Biological notes of the Indian species of this family are arranged in systematic order, and the geographical distribution is given, most of the records being new. A list is also given of species of trees with the species of Brenthids associated with them.

GARDNER (J. C. M.). **On some Indian Brenthidae (Coleoptera). Part III. Description of (*a*) the larva of *Cerobates tristriatus* Lund. (*b*) The Larva of *Cerobates sexsulcatus* Motsch. (*c*) The Pupa of *Cyphagogus corporaali* Kleine.**—*Indian Forest Records*, xi, pt. 4, pp. [189]–[194], 1 pl. Calcutta, 1925.

The immature stages of Brenthids here described were collected in India and comprised *Cerobates tristriatus*, Lund., from *Bombax malabaricum*, and *C. sexsulcatus*, Motsch., and *Cyphagogus corporaali*, Kleine, from *Butea frondosa*.

Beeson (C. F. C.). **The Teak Canker-grub** (*Dihammus cervinus*).— *Indian Forester*, li, no. 5, pp. 187–192, 1 pl. Allahabad, May 1925.

The Longicorn, *Dihammus cervinus*, Hope, is a pest of considerable importance in teak-growing areas of Japan, China, Burma, Assam, Bengal and North India, though it is unknown in the teak areas of the Indian Peninsula. The beetles begin to appear in April with the rainy season, and feed on the soft bark of saplings, making shallow, irregular patches. The eggs are laid low down on the stem, and the larvae bore into the inner bark and sapwood. As a result of injury to the cambium, a globular canker is formed about twice the diameter of the stem by the following spring. Pupation occurs in March and April, so that there is one generation in a year. The cankers may be again attacked in subsequent years. Termites and ants frequently prevent the healing of the wounds formed, causing rot to develop, and a teak stem may be so weakened by insects and by woodpeckers enlarging the tunnels that it breaks off at a canker. Other food-plants of *D. cervinus* are *Gmelina arborea* (which does not generally show more than a slight swelling as the result of attack) and *Clerodendron infortunatum*, the latter shrub probably being the natural food. The chief attack in this plant is at the root, which is hollowed out. The borer is found more abundantly in *Clerodendron* than in tree plantations in the same locality ; evidence indicates that teak outgrows its liability to serious damage in the 7th or 8th year, while *Gmelina* acquires immunity at an earlier age.

Where supervision of labour is possible, the most successful measure is the killing of early stage larvae by slitting the bark tunnels in the first months of development, that is, in July or August, the site of attack being easily recognisable by the exudation of sap and frass. Oviposition on the lower parts of the stem may be prevented by deterrents, such as tar, creosote or carbolineum, painted on early in May. The cost of materials might be prohibitive, but experiments are desirable. Oviposition may be prevented by a wrapping of grass or shrubs, which can be made of the undergrowth that is usually cut back at the time when the beetles are ovipositing. If this is stacked in sheaves round the stem of the tree and tied in place with twists of grass or creeper, it will entirely conceal the bark from the ground level to the lower leaves. This method is to be tested on large areas.

Andrews (E. A.) & Tunstall (A. C.). **Notes on the Spraying of Tea.**— *Indian Tea Assoc.* [Pubn.], no. 1, 1915 [No. 38], Revised Edn. 1925, 75 pp., 10 pls. Calcutta, 1925.

The original edition of this paper has been noticed previously [*R.A.E.*, A, iii, 488].

Jardine (N. K.). **The Control of Tea Tortrix.**— *Year-Book Dept. Agric., Ceylon, 1925*, pp. 4–6. Peradeniya, 1925.

The remedial measures that have been tried in Ceylon against *Homona coffearia*, Niet. (tea tortrix), such as collection of egg-masses, destruction of larvae, etc., are considered of little value, as no measure can become permanently effective until flight breaks are adopted.

There seems to be a strong prejudice against making use of this remedy ; it is argued that many estates already possess shade in the form of leguminous trees, and that further planting will impoverish

the soil, but the trees at present growing, although probably adequate in numbers, are practically useless as flight breaks, as they are indiscriminately scattered instead of being placed in definite double rows in the required direction. Another difficulty is that of selecting trees suitable to the different districts, and this must be met by trials. Although 4 or 5 years must elapse before flight breaks can function as such, the same objection might be raised against planting tea at all, as it gives no return for from 3 to 5 years.

JEPSON (F. P.). **The Control of Shot-hole Borer of Tea** (*Xyleborus fornicatus*).— *Year-Book Dept. Agric., Ceylon, 1925*, pp. 6–10. Peradeniya, 1925.

As the results of preliminary manuring experiments for the purpose of controlling *Xyleborus fornicatus* (shot-hole borer of tea) were promising [*R.A.E.*, A, x, 540], it was decided to repeat the experiments on a larger scale and to note, particularly, the extent to which the healing of the entrance holes of the galleries was promoted by the various manures. These tests were begun in 1923 and are still in progress. The manures were arranged to provide nitrogen, potash and phosphoric acid at the rate of 40, 30 and 20 lb. per acre per annum respectively. Nitrogen was provided by ammonium sulphate and sodium nitrate, potash by potassium chloride and potassium sulphate and phosphoric acid by ephos phosphate and super-phosphate. Lime was included at the rate of 1 ton per acre per annum. Applications were made in August 1923 and August 1924. The result of a first examination is extremely promising, indicating that the healing of the entrance holes is promoted to a very marked degree by nitrogenous manures and also, but to a less extent, by potash and phosphoric acid manures, though lime has no influence in this respect. An experiment with general manures was begun in 1920 and concluded in 1923, a pruning mixture of 60 lb. each of nitrolim and potassium chloride and 80 lb. ephos phosphate being applied in August 1920, and a general mixture of 250 lb. fish manure with 60 lb. ammonium sulphate and 40 lb. potassium chloride being applied in August 1921 and again in August 1922. The conclusions reached were that manuring with a complete fertiliser accelerates the rate of healing of gallery entrances, increases the number of empty galleries and causes smaller broods to be raised. Manuring does not, however, seem to have any influence on the degree to which bushes are attacked by the borer.

As the primary damage to tea bushes by *X. fornicatus* is the fracture of the branches at the point where the gallery occurs, with the resulting loss of crop, the reinforcement of this weakened portion by the healing over of the gallery entrance holes, thus reducing the liability to fracture, is of the greatest importance, and since the beetles cannot be prevented from attacking the branches, the rapid repair of the damage they cause is very desirable.

HUTSON (J. C.). **Further Notes on some of the Caterpillars attacking Coconut Leaves.**— *Year-Book Dept. Agric., Ceylon, 1925*, pp. 23–26, 1 pl. Peradeniya, 1925.

The legislation that has been passed against *Nephantis serinopa* (coconut caterpillar) in Ceylon is reviewed [*R.A.E.*, A, x, 130 ; xiii, 72]. As it is important to distinguish this pest, for which control measures

have been made compulsory, from others infesting coconuts, a brief account is given of some caterpillars that might be mistaken for it. Among the commonest is *Herculia nigrivitta*, which is frequently found in old, dead, rolled-up coconut leaves killed by *N. serinopa*, or in the galleries vacated by it. The stages of the moth are described and contrasted with those of *N. serinopa*. Another caterpillar is that of *Erechthias pachygramma*, which has somewhat similar habits, in that it feeds only on dead or diseased portions of the leaflets and sometimes uses the galleries of *N. serinopa*. The complete life-histories of these moths have not been worked out, but it seems probable that eggs are laid on the leaflets and among the frass-covered galleries of *N. serinopa*.

AUSTIN (G. D.). **Some Beetle Pests of Cucurbits in Ceylon.**— *Year-Book Dept. Agric., Ceylon, 1925*, pp. 41–47, 2 pls. Peradeniya, 1925.

In a study of vegetable pests of Ceylon, observations have as as yet been limited to the three important beetles on gourds. The Chrysomelid, *Aulacophora stevensi*, is a common pest of the snake-gourd, *Trichosanthes anguina*, and also attacks *T. cucumerina*, the beetles feeding on the leaves and young shoots and occasionally attacking the stems. Eggs are laid in cracks in the soil around the young plants, and two weeks later the larvae hatch and feed on the roots, tunnelling inside them; later they restrict their attack to the collar of the plant. As a result, the creeper wilts, and fails to flower or fruit. The beetles of the second generation strip the leaves of their tissues and attack the flowers and even the gourds and stems. No parasites have been observed. The remedies suggested are rotation of crops, examination of young plants soon after germination and collection of any beetles observed, sprinkling of ashes round young plants to prevent oviposition, digging about the collar and removing any grubs and then earthing up the soil round the creepers, clean cultivation, destroying old creepers as soon as the gourds are picked, and digging up the soil to expose grubs and pupae to the sun. A few creepers should be left as traps, and as soon as the beetles have concentrated on them they should be captured and the traps dug up and burnt.

The Coccinellids, *Epilachna dodecastigma* and *E. vigintioctopunctata*, oviposit on the lower surface of the leaves, the oviposition period continuing for several weeks and the maximum number of eggs observed for one female being 800. The former species attacks *Solanum melongena* (brinjal or egg-plant) and *T. anguina*; the latter confines itself to *S. melongena* and *Momordica charantia* (bitter-gourd). The larvae hatch in 5-7 days and feed slowly on the lower surface of the leaves. After about 21 days pupation occurs on the leaf, and after 5 to 8 days the adult emerges. The adults, like the larvae, nibble away strips of leaf tissue and sometimes eat irregular holes in the leaves. The beetles occasionally feed on the flowers and on the rind of the gourd. Hymenopterous parasites seem, as a rule, to effect an adequate control. In heavy infestations, handpicking in all stages seems usually to be the only practicable measure. Spraying or dusting with Paris green or lead arsenate should be effective, and such cultural methods as rotation of crops and destruction of remnants after harvesting should reduce the numbers considerably.

GATER (B. A. R.). **Some Observations on the Malaysian Coconut Zygaenid** (*Artona catoxantha*, **Hamps.**).—*Malayan Agric. Jl.*, xiii, no. 4, pp. 92–115. Kuala Lumpur, April 1925.

Most of the outbreaks of *Artona catoxantha*, Hamps., have so far occurred on native holdings, and the pest has seldom affected European-controlled estates. The apparent inability of the cultivator to see the caterpillars until the leaves are swarming with them often delays notification of the pest until the information is too late for the investigation of the earlier stages, with the result that the causes of outbreaks are unknown. The attacks are, as a rule, eventually controlled by natural enemies. *A. catoxantha* has been recorded from Java, Sumatra, Labuan, Sandakan and Malaya. The presence of the feeding marks made on the pinnae by the caterpillars has been observed on nearly every coconut estate visited in Malaya, and the marks differ so clearly from those made by any other coconut insect, that the distribution may be considered general in the Malay Peninsula. Outbreaks tend to recur in certain localities, and an attack of moderate severity may result in the loss of about a year's crop, though the palms are not killed outright. The life-cycle lasts 5 to 6 weeks. Eggs are laid singly on the underside of the pinnae. The larvae feed on the lower surface, but the later stages may eat the edges also. Pupation takes place on the leaf.

The natural enemies of *A. catoxantha* include : The Ichneumonids, *Goryphus maculipennis*, Cam., and *G. maculiceps*, Cam. ; a Braconid, *Microgaster* sp., and a Chalcid, *Tetrastichus* sp., both of which are uncommon ; a Clerid beetle, *Callimerus* sp., which is usually found in small numbers feeding on pupating larvae and on the pupae ; and three Tachinids, including *Ptychomyia remota*, Ald.

The last named is considered the most important parasite of *A. catoxantha*. It is distributed over the greater part of the area where its host occurs, and has a life cycle of 20 days, though in some instances the life of the adult may be prolonged. It is attacked by a number of hyperparasites. Mating takes place on the same day or the day following emergence, eggs being laid 3 to 8 days later. The average number of eggs is between 25 and 30. The egg is usually laid on the dorsal surface of the caterpillar ; there is generally only one, and in any case only one larva develops. Parasitised caterpillars are usually found in groups. The resulting larva remains within the caterpillar until the latter has spun its cocoon, and it then emerges and pupates. The pupal period lasts 9 days. *P. remota* does not, as a rule, lay eggs until the larvae of its host have reached their third instar, which occurs 14 days before pupation. It has been bred on the caterpillars of *Achaea janata*, L., and *Sylepta derogata*, F., though eggs failed to hatch when laid under experimental conditions on the larvae of a number of other moths. An attempt was made to keep the pupae of *P. remota* in cold storage with a view to transporting it over long distances, but without success. The low temperature seemed to have little effect on pupae from which the flies were almost due to emerge, but the immature pupae were killed at temperatures of 41° and 50° F. in two weeks, and failed to survive a month at temperatures of 55·4° and 57·2° F.

A fungus, *Botrytis necans*, attacks the later larval stages of *A. catoxantha*, apparently causing the death of considerable numbers [*R.A.E.*, A, ii, 583], but its artificial propagation has not met with success. As regards remedies, the cutting off and burning of infested

leaves, apart from the injury done to the palm, has the disadvantage, in common with spraying with lead arsenate and kerosene emulsion, of killing large numbers of parasites as well as the pest; but in view of the fact that the principal parasite, *P. remota*, rarely oviposits on young caterpillars, it is possible to kill the caterpillars in their early stages without damaging this parasite if spraying is done at the right time and supplemented by banding and the use of a strong jet of water during the first, and early stages of the second, instar. As there appears to be a connection between the occurrence of outbreaks of the pest and the burning of rubbish under the palms, this practice should be abandoned. The introduction of parasites in large numbers from other areas and their release in the infested districts should be an effective method of control. *P. remota* has not, however, been reared successfully in the laboratory in large numbers, owing to the numerous infertile eggs that were produced. This was believed to be due entirely to the improper feeding of the adult flies. Food is an important factor in the oviposition and fertility of *Musca domestica* and other flies, and there seems to be little doubt that the same applies to Tachinids.

MARSHALL (G. A. K.). **New Species of Curculionidae from the Sunda Islands (Coleoptera).**—*Treubia*, vi, no. 2, pp. 212–220. Batavia, February 1925.

The new weevils described include *Heteroglymma setosa*, injurious to seeds of cinchona in Java.

FRIEDERICHS (K.). **Drie jaren Koffiebessenboeboek.** [Three Years Experiences with the Coffee Berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 12, 74 pp. Soerabaya, 1925.

Most of the data embodied in this résumé of the occurrence and control of the coffee-berry borer [*Stephanoderes hampei*, Ferr.] in the years 1921, 1922 and 1923 were obtained at Malang, Java.

BATHELIER (J.). **Observations sur les prédateurs des cochenilles à Stick-lac.**—*Bull. écon. Indochine*, xxviii, no. 170, pp. 59–66. Hanoi, 1925.

The different varieties of trees in Indo-China producing stick-lac are discussed under their popular names only, the author giving his opinion as to the best variety to cultivate in new plantations. The only serious obstacle to a large increase in the production of this commodity is the destruction of the lac-producing Coccids by ants, of which the most dangerous are *Cremastogaster walshi*, Forel, and *Camponotus rufoglaucus*, Jerdon. The ant, *Oecophylla smaragdina*, F., is said by native cultivators to be very beneficial to the lac insect, as it defends the trees from other ants, but it is considered impracticable to extend this protection by breeding and disseminating *O. smaragdina*. As the only time when the lac insects are exposed to the attacks of ants is when they are transferred to fresh trees by the cultivators, the application, at an opportune moment, of adhesive bands to the trees will prevent the ascent of ants. An efficient substitute for the American tanglefoot, which can be readily made of locally obtained materials, is described.

Bathelier (J.). **Observations sur un Insecte parasite du poivrier.**—*Bull. écon. Indochine*, xxviii, no. 170, pp. 67–72, 1 pl. Hanoi, 1925.

A Tingid of the genus *Elasmognathus*, probably a variety of *E. nepalensis*, Dist., is very injurious in Indo-China to the pepper vine (*Piper nigrum*). During the whole of the flowering period (from February to October), the blossoms are covered with both larvae and adults, which puncture the peduncles of the flowers, extract the sap and prevent fruiting. From October onwards only a few adults remain, but these are sufficient to carry over the infestation to the next flowering season. It is thought that the eggs are laid on the flowers. As much as one-third of the crop is frequently lost owing to this insect. Frequent spraying with nicotine is recommended. There is a native plant belonging to the Dioscoreaceae, the root of which contains an alkaloid resembling strychnine; a little of this may be used in part substitution for the nicotine, but it should be used very cautiously, as it would probably be injurious to the plants.

Yasukawa (S.). **Experiments with the Fungus,** *Metarrhizium anisopliae*, **Motsch., parasitic upon Insects injurious to the Sugar-cane.**—*Dept. Agric., Formosa Govt. Res. Inst.*, Rept. no. 11, 81 pp., 3 pls. Taihoku, Formosa, August 1924. (In Japanese.)

Metarrhizium anisopliae was introduced into Formosa from Hawaii in 1914 and infests various Lamellicorns and other insects injurious to sugar-cane. Experimentally from 25 to 33 per cent. of adult Lamellicorns and 13 to 33 per cent. of the larvae died in soil infected with the spores of this fungus. When the spores were placed directly on the bodies of the beetles, a still higher percentage became infected, and in fields containing spores of this fungus the number of beetles was greatly reduced.

Ishikawa (K.). **List of Animals parasitic upon the Larvae of** *Bombyx mori*.—*Dobutsugaku Zasshi* [*Zool. Mag.*], xxxvi, no. 433, pp. 482–484. Tokyo, November 1924. (In Japanese.)

The known parasites of the larvae of *Bombyx mori* include the Protozoa, *Herpetomonas korschelti*, *Entamoeba ? blattae*, *Coccidium* sp., *Nosema bombycis* and *Chlamydozoa bombycis*; the Tachinid flies, *Sturmia sericariae*, Rond., and *Tachina rustica*, L.; and the mites, *Pediculoides* sp., *Tyroglyphus* sp., *Gamasus* sp. and *Cheyletus* sp.

Ishii (T.). **Two Chalcids injurious to Bamboos.**—*Dobutsugaku Zasshi* [*Zool. Mag.*], xxxvii, no. 437, pp. 131–136. Tokyo, March 1925. (In Japanese.)

Harmolita phyllostachitis, Gahan, and *Aiolomorphus rhopaloides*, Wlk., are described as infesting bamboos. The former has probably been imported into the United States from Japan. The latter has one generation a year, and hibernates in the pupal stage. The adults appear from the end of March to the middle of April and oviposit upon the young shoots, the larvae pupating at the end of September.

KUWANA (I.). **The Diaspine Coccidae of Japan, I.**—*Dept. Agric. & Comm., Japan, Bur. Agric.*, Injurious Insects & Pests Ser., no. 14, pp. 1–18, 3 pls. Tokyo, 30th March 1925.

Poliaspis pini, Mask., on *Pinus* spp., *Ischnaspis longirostris*, Sign., on palms in greenhouses, *Parlatoria ziziphus*, Lucas, on *Citrus*, *P. pergandei*, on *Citrus* and other plants, *P. proteus*, Curtis, and *P. theae*, Ckll., on various plants, and *P. mangiferae*, Marlatt, which is a greenhouse pest in Japan, are described in detail.

VAN POETEREN (N.). **Verslag over de Werkzaamheden van den Plantenziektenkundigen Dienst in het Jaar 1924.** [Report on the Work of the Phytopathological Service in the Year 1924.]—*Verslag. & Meded. Plantenziektenk. Dienst*, no. 41, 62 pp., 2 pls. Wageningen, May 1925.

Heterodera schachtii, Schm., attacked barley in a field where oats had been infested by this Nematode two years previously. The heads of beet were infested by the caterpillars of *Gortyna* (*Hydroecia*) *micacea*, Esp., which are common in potato stems. The beet-beetle, *Atomaria linearis*, Steph., caused considerable loss in many localities. Red clover was attacked by weevils of the genus *Apion*. The Nematode, *Aphelenchus modestus*, de Man., was recorded for the first time as injuring clover. The occurrence of *Tylenchus dipsaci*, Kühn, in iris bulbs appears also to be a new record. A weevil, *Phytobius comari*, Hbst., usually known from *Comarum palustre*, occurred on roses. Hydrangeas in a greenhouse were attacked by *Tachycines asynamorus*, Adelung. Columbines were injured by *Pristiphora alnivora*, Htg. Chrysanthemums were infested by larvae, probably of *Spilographa artemisiae*, F. Carnations were mined by the larvae of *Hylemyia fugax*, Mg., which is smaller than *H. nigrescens*, Meade, the carnation fly in England. A large currant plantation was severely injured by the larvae of a sawfly, *Pristiphora pallipes*, Lep. Strawberries were attacked by the larvae of *Blennocampa geniculata*, Steph., which feed on the leaves, and a spray of Paris green or barium chloride should be used for it. Tomatos were infested by the caterpillars of *Polia* (*Hadena*) *oleracea*, L., both foliage and fruits being injured. Spraying with lead arsenate and trapping are the remedies advised. Garlic of Hungarian origin was found to harbour the small caterpillars of a Cossid, *Dyspessa ulula*, Bkh. Beans were injured by the weevil, *Sitona lineata*, L.

Aphelinus mali, Hald., the Chalcid parasite of the woolly apple aphis [*Eriosoma lanigerum*, Hausm.], was introduced into Holland in 1924, but it remains to be seen whether it has survived the damp winter.

TATTERSFIELD (F.), GIMINGHAM (C. T.) & MORRIS (H. M.). **Studies on Contact Insecticides Part iii. A Quantitative Examination of the Insecticidal Action of the Chlor-, Nitro- and Hydroxyl Derivatives of Benzene and Naphthalene.**—*Ann. App. Biol.*, xii, no. 2, pp. 218–262, 12 diagr., 6 tables. Cambridge, May 1925.

The object of these investigations has already been outlined [*R.A.E.*, A, xiii, 158]. The present paper deals with the general results obtained with a group of interrelated substances that are all derivatives of the aromatic hydrocarbons, benzene, toluene and naphthalene. Regarding the hydrocarbons as the parent bodies of the various derivatives,

an attempt has been made to follow the effect of the substitution in these compounds of different chemical groups. For various reasons it has not been possible to obtain quantitative results of a high degree of accuracy with every substance tested, though the results give a definite indication of relationships between chemical constitution and toxicity to insects in certain groups of compounds, which can be followed up in further work. Like the previous tests, these were made on *Aphis rumicis*, L., and with all compounds that appeared likely to be of practical importance; experiments on the effect upon various types of foliage were included. Benzene has no significant toxicity to *A. rumicis*, even at very high concentrations, toluene is definitely toxic above 25 per cent., and xylene slightly more toxic than toluene. At concentrations over 25 per cent., the emulsions had an almost gelatinous consistency, making their use for spraying purposes more difficult and probably influencing the toxic effect. The introduction of a nitro-group into the benzene ring considerably increases the toxicity, and a second nitro-group still further accentuates it, m-dinitro-benzene being a highly toxic compound. The products arising out of the substitution of one chlorine atom into benzene and toluene also show an increased toxicity over the parent bodies, and a progressive increase is noticed on passing from monochlorbenzene to the dichlor- and trichlor-derivatives. The o-dichlor-benzene is more poisonous than its isomer p-dichlor-benzene. There is no significant difference between the three isomers, o-, m- and p-chlor-nitro-benzene, and they are not appreciably more toxic than nitro-benzene. The introduction of a second nitro-group to form 1-chlor-2 : 4-dinitro-benzene increases the poisonous properties, but the compound is apparently less toxic than the corresponding dinitro-benzene. The presence of a third group as in picryl chloride, brings about a marked decrease, and the compound has no significant toxicity below 1 per cent. Benzyl chloride has a very low toxicity, possibly owing to the readiness with which it undergoes chemical changes. Phenol and cresols differ very slightly from each other in toxicity, and their effectiveness against the Aphids is low. Naphthalene itself is not very toxic, but there was some difficulty in getting it into a suitable form for spraying. Tetra-hydro-naphthalene (tetralin) does not present the same difficulty, and as it is likely to be available in considerable quantities, it may prove of interest from a practical point of view. It is similar in toxicity to naphthalene. Of the nitro-naphthalene series a-nitro-naphthalene is fairly toxic at 1 per cent. and may be worth further investigation. This compound is not injurious to foliage of hazel, hawthorn and bean. The chlor-benzene derivatives possess anaesthetic properties that render the determination of their actual toxic values rather uncertain; similar properties cannot be excluded for the chlor-naphthalene group without further investigation. Owing to the toxic effect of certain compounds to Aphids and their injurious effect on foliage, they were tested against the eggs of the Geometrid, *Selenia tetralunaria*, Hufn. The relative toxicities of the chlor-nitro-benzenes run approximately in the same order as that found in the tests with *A. rumicis*, though, as was to be expected, the actual toxicity to the eggs is in all cases less than to the Aphids. Nitrobenzene and the mono- and dichlor- and mono-chlor-nitro-derivatives of benzene are all without marked toxic action. Contrary to the result of experiments on Aphids, no very marked differences in toxicity to the eggs could be found between the mono-nitro-cresol-derivatives.

Of the compounds dealt with, dinitro-o-cresol and its salts stand out as specially highly toxic to both Aphids and eggs, but they are extremely injurious to foliage (hazel, hawthorn, bean) even at low dilutions, and in the dry condition the salts ignite very readily and are to some extent explosive. Owing to the marked toxicity to insect eggs further work on dinitro-o-cresol seems desirable. Preliminary experiments indicate that dormant buds of apple are not damaged when it is used at a concentration of 0·25 per cent. ; trials on a practical scale are now under way. A comparison of the present results and those recorded by Richardson and Smith [*R.A.E.*, A, xi, 409] shows an agreement with regard to the relative toxicities of benzene, toluene and xylene, but a variance with regard to trichlor-benzene; this difference, however, cannot be stressed owing to the difficulty of determining the toxicities of the chlor-derivatives on account of complications due to anaesthesia.

Taking the results of these experiments as a whole, it does not seem possible to correlate toxicity in a satisfactory manner with any one simple chemical or physical property characteristic of the group of compounds. Insecticidal action depends on a complex of physical and chemical properties, which determine the physiological effects to which death is due.

Edwards (F. W.). **A Synopsis of British Bibionidae and Scatopsidae (Diptera).**—*Ann. App. Biol.*, xii, no. 2, pp. 263–275, 2 figs. Cambridge, May 1925.

Though the majority of the Bibionids are saprophagous in their habits, some are beneficial, such as *Dilophus febrilis*, which is probably one of the most important agents in the fertilisation of fruit-blossom, whilst others are secondary pests of some importance, attacking roots and tubers. Keys are here given for the identification of the adults of the British species.

Cunliffe (N.). **Studies on *Oscinella frit*, Linn. A preliminary Investigation of the Extent of the Recovery Power of Oats when subject to Injury.**—*Ann. App. Biol.*, xii, no. 2, pp. 276–286. Cambridge, May 1925.

The problem of recovery of oats after damage is difficult to elucidate, as it would appear to depend on several factors, which may not always be constant in operation. In previous observations [*R.A.E.*, A, xii, 562] recovery appeared to be dependent mainly on the capability of the plant to produce effective tillers after the first shoots had been destroyed. Recovery should depend, therefore, on the rapidity of growth of the dormant buds after stimulation and on the capability of early ripening possessed by such shoots, factors which presumably vary with the variety. During the summer of 1924 investigations were made of the extent of recovery of oats after injury approximately similar to that caused by *Oscinella frit*, L. Two varieties of oats were used, one being a prolific, the other a poor, tillerer. The results are discussed, showing the number of panicles produced, the height of fruiting stem, spikelet production and yield of grain in the injured and healthy plants. Recovery appeared to be much more marked in the poor tillering variety, and it cannot necessarily be foretold from a knowledge of tillering capacity. Under field conditions, where capability of covering the ground after losses may be comparatively

small, as in the case of a weak tillering variety (although poor initial tillering capacity may be compensated for by an increased population), the prolific tillering variety might give a better yield of produce than the weaker, though the latter may exhibit greater recuperative powers. This problem is intimately related to the general problem of yield, which awaits solution.

FRYER (J. C. F.). **A Discussion on the General Principles that should underlie Government Action respecting Fungicides and Insecticides.** —*Ann. App. Biol.*, xii, no. 2, pp. 287–301. Cambridge, May 1925.

Insecticides may be considered as belonging to two definite classes, those of which the active chemical ingredient is declared, such as lead arsenate paste, and those that are sold under some fancy name with little or no information as to what the article contains. Government action regarding the former class is relatively simple. The existing research and advisory organisation can test any given chemical both in the laboratory and under commercial conditions in the field, the results can be published, and the Government directly or indirectly can ensure that the practical deductions are available and are demonstrated to growers. As practically every chemical of the declared class that is now on the market has been dealt with in this manner, no change appears to be needed. For various reasons materials of the secret class cannot be dealt with in exactly the same manner. Though public and official testing can prove very valuable in regard to declared insecticides, they are not feasible in the case of the secret preparation unless reinforced by some legislative measure. In considering the second line of Government action—the passing of legislation to control the sale of insecticides—the two classes must again be considered separately. In the case of the declared preparations such as lead arsenate, it does not so much matter what the exact amount of arsenic oxide (As_2O_5) is in a given paste, so long as the grower has the facts before him, for otherwise he will treat all lead arsenate pastes as of equal strength. The sale of arsenate pastes containing more than a harmless quantity (under 1 per cent.) of water-soluble arsenic should be prevented. In the case of secret preparations, the only remaining scheme of legislation would appear to be the bold one of compelling the sellers to declare the names and percentages of the active ingredients in their articles, which is tantamount to doing away with the secret class of product altogether. However, it is considered that absence of Government action with regard to the secret class has a logical basis, as if the grower has at his command declared insecticides properly tested and guaranteed, he should take his own risk if he prefers to use those in the secret class.

In the discussion following this address, Mr. T. Parker stated that should Government legislation be needed in regard to insecticides he would favour some form of registration and approval, such as exists for the sale of sheep dip, without the declaration of toxic ingredients; the obvious reasons are enumerated. A declaration without some form of protection would mean throwing away the results of many months' tedious and patient research work, at any rate from the commercial point of view. The various points that would have to be considered in any scheme involving registration or legislative control are indicated. Mr. Tattersfield stated that it would be necessary for any set of regulations to be sufficiently elastic to allow

compounds to find their way readily into use, and if it was considered that a public declaration would do harm to enterprising manufacturers, it might be advisable to consider whether in certain cases a declaration made in confidence to the Government Department or Testing Authority might not be substituted. Dr. Voelcker thought that legislation should be introduced to ensure that everything sold for a specific purpose should be able to satisfy the Authorities that it was effectual, and it was also necessary to secure that it be kept up to the declared nature and strength. In summing up, Mr. Fryer said he felt a solution proposed by Mr. Goodwin to be the right one, and that a revision of the Patent law so as to give manufacturers real protection in the case of new discoveries for a period of five to seven years would remove practically all the objections to the declaration of active ingredients in the secret class of preparation. The chief difficulty in the way of legislation would thus be avoided.

FUSCHINI (C.). **Il moscherino suggiscorza dell'olivo.** [*Clinodiplosis oleisuga*, **Targ.**]—*Riv. Agric.*, xxx, no. 22, p. 340. Rome, 29th May 1925.

The information given here is identical with that already noticed [*R.A.E.*, A, xiii, 295].

WILLAUME (F.). **Caractères généraux et position systématique des Physapoda, Duméril-Burmeister.**—*Rev. Zool. agric. & appl.*, xxiv, nos. 1–3, pp. 1–12, 36–46, 53–59, 2 pls., 17 figs. Bordeaux, January-March 1925.

Very little attention has been given to the thrips occurring in France, where at least 100 species are probably present. Their economic position is a matter of some importance ; certain species are regarded as beneficial while others may do considerable damage. The synonymy of the order is discussed, the author regarding the name Physapoda as being the correct one. A general account is given of the external and internal morphology of the adult, and the biology of these insects. The characteristic injury to flowers and foliage is described, and a list is given of the natural enemies of thrips. Their systematic position is explained.

FEYTAUD (J.). **Les traitements d'hiver contre l'Eudémis et la Cochylis.**—*Rev. Zool. agric. & appl.*, xxiv, no. 1, pp. 12–19, 1 fig. Bordeaux, January 1925. [Received 2nd June 1925.]

The winter treatments for the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] described include the removal of the bark, hotwater treatment (generally used against the Pyralid [*Sparganothis pilleriana*, Schiff.]) and whitewashing of the trunks. Shelter-traps and the cultural practice of earthing up are also recommended. The vine supports should also be attended to as they harbour many pupae ; they can be easily treated with insecticide washes, or be dipped or disinfected with hot water or steam.

FEYTAUD (J.). **A propos des Lâchers de Cailles pour la lutte contre les Insectes ravageurs.**—*Rev. Zool. agric. & appl.*, xxiv, no. 2, pp. 29–36. Bordeaux, February 1925.

As attempts are being made to re-establish quails as a game-bird in certain parts of France, with a view to deterring people from shooting

small insectivorous birds, especially in those regions infested with dangerous insect pests, some observations have been made, which show that quails have also a certain value in the direct control of insects. It is found that they will readily devour numbers of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] even when grain is available, and also eat *Otiorrhynchus*.

FEYTAUD (J.). **La destruction des Termites dans les murs.**—*Rev. Zool. agric. & appl.*, xxiv, no. 2, pp. 47–50. Bordeaux, February 1925.

Chloropicrine, which is in many cases an excellent measure against termites in houses and buildings, cannot always be used with success, especially when the insects are well established within the thickness of the walls. In such cases, architects have hitherto had no other remedy than to demolish the portions attacked and rebuild them entirely. Experiments were made in which liquids or volatile substances were injected into the entrance of the galleries, but neither penetrated far enough into the long and tortuous network, and only a few individuals were killed. It was noticed that the colonies concentrated for preference at points where the wood showed a certain degree of humidity, such as close to gutters or drains, and in badly ventilated places. The author therefore conceived the plan of offering some favourable point of concentration to the termites in order to draw them out of their galleries in the walls, and at a suitable spot a fragment of wood which was not infested, but was favourable for attack, was driven into the wall or into the ground close by, to act as a sort of vent or drain from the centre of infestation. As soon as such a trap is discovered, the termites attack it in large numbers, and in two or three weeks it is completely riddled. The trap can then be withdrawn and plunged into boiling water or burnt, and replaced by another, until the infestation is cleared out. This method is very promising, and improvements in the details to meet special cases are being investigated. It must be remembered, however, that if the wood in which the termites are established offers them more favourable conditions than the trap, such as being kept constantly moist by proximity to a gutter, it is not readily abandoned. The trap method can often be successfully combined with others, such as ventilation of the infested places, or the use of repellents to render them less habitable to the termites. The trap might also be impregnated with substances attractive to the insects.

FEYTAUD (J.). **Le Doryphore et les poules.**—*Rev. Zool. agric & appl.*, xxiv, no. 3, pp. 59–63. Bordeaux, March 1925.

In some experiments described in this paper, made for the purpose of determining to what extent fowls are of use in destroying the Colorado potato beetle [*Leptinotarsa decemlineata*, Say], it was found that one bird, when offered these insects for the first time together with a good supply of grain, ate 138 individuals in 9 days, the adult insects being distinctly preferred to the larvae.

Le Service phytopathologique en Espagne.—*Rev. Zool. agric. & appl.*, xxiv, no. 3, pp. 66–70. Bordeaux, March 1925.

The decree of 20th June 1924, regulating the conditions of entry of plants and agricultural produce into Spain, as laid down by the phytopathological service, is given verbatim.

GAUTIER (C.) & BONNAMOUR (S.). **Un *Aphidius* (Hym. Braconidae) parasite du Puceron du Pêcher.**—*Bull. Soc. ent. France*, 1925, no. 7, p. 127. Paris, 1925.

The peach aphis [*Myzus persicae*, Sulz.] which was very abundant in certain districts of the south of France in 1923, was found to be parasitised to a very high degree by a small species of *Aphidius*, which may prove to be identical with *A. cardui*, Marsh. This parasite will be of great economic importance in the Lyons region.

GAUTIER (C.). **A propos des Braconides (Hym.) parasites d'*Argyroploce variegana*, Hb., et de *Recurvaria nanella*, Hb.**—*Bull. Soc. ent. France*, 1925, no. 7, p. 128. Paris, 1925.

Some slight additions are made to the author's description of *Ascogaster annularis*, Nees, as given in a previous paper [*R.A.E.*, A, xii, 145].

DAVIS (A. C.). ***Neoclytus carus* and *modestus*.**—*Pan-Pacific Ent.*, i, no. 4, p. 169. San Francisco, Cal., April 1925.

Several examples of *Neoclytus* were reared from oak in California in 1924, about half being grey and white and the others yellow and black. They were identified as *N. modesta*, Fall, and *N. carus*, Fall, respectively, but mating was constantly observed between the two, and dissections showed that *N. carus* is the female of *N. modestus*.

JONES (W. W.) & BRISLEY (H.). **Field Notes concerning a few Arizona Hispinae.**—*Pan-Pacific Ent.*, i, no. 4, pp. 174–175. San Francisco, Cal., April 1925.

The habits of several leaf-mining Hispids are discussed. Larvae and pupae of *Chalepus ater*, Weise, were found in large blotch mines in leaves of the common cultivated bean during late August 1924, and adults appeared within a few days. The amount of damage could not be determined owing to the still more marked injury caused by *Epilachna corrupta*, Muls. A plot of beans in the Huachuca Mountains was partly destroyed by this Hispid, the species not having previously been observed there, though beans had been grown for a number of years.

ESSIG (E. O.). **Economic Notes.**—*Pan-Pacific Ent.*, i, no. 4, pp. 188–190. San Francisco, Cal., April 1925.

Eggs of the codling moth [*Cydia pomonella*, L.] taken from walnuts in California have been found by S. E. Flanders to be parasitised by *Prospaltella*. No Aleurodid or Diaspine scale (the usual hosts for *Prospaltella*) were found on the nut itself, but *Aspidiotus juglans-regiae* has been observed on leaf petioles and the current season's growth.

Eriophyes pini, Nal. (pine needle mite) is reported by E. Walther as being troublesome on pines, especially *Pinus radiata* (Monterey pine) in San Francisco, the needles turning brown and falling off. The mites spend their life within the tight-fitting basal sheath of the needle clusters, except when migrating to young needles in the spring. The means of dispersal are unknown, but the infestation is spreading. The only effective remedy at present known is the destruction of affected trees.

DAVIDSON (J.). **The Bean Aphis.**—*Jl. Minist. Agric.*, xxxii, no. 3, pp. 234–242, 2 pls. London, June 1925.

Aphis rumicis, L., has a wide distribution in Great Britain, and under favourable weather conditions may increase to very injurious numbers on broad beans. Its life-history and biology are described, and the factors influencing the degree of infestation, such as climate, food-plants, variety of bean, age of the plant attacked and the influence of soil conditions and manurial treament are discussed. In the field, good cultivation and manuring will enable the plants to recover more readily from attack, and the less susceptible varieties of bean should be grown where possible. Early sowing will give the plants a better chance, and the cutting down of a few heavily-infested bean plants during the early stages of attack (in May) will reduce the ultimate infestation. Other susceptible crops, such as sugar-beet and mangels, should not be grown near beans. The destruction of the winter food-plant (*Euonymus*) has been advocated, but would not have the desired effect, as the Aphid can winter on other plants. In warm, sheltered situations, parthenogenetic reproduction may go on throughout the winter. The author has carried on continuous parthenogenetic generations for four years on beans. In small vegetable gardens the same remedies are advocated. Rhubarb and asparagus should be watched for colonies of *A. rumicis* in early summer, and also plants, especially *Euonymus japonicus*, kept under frames or in glasshouses during winter. In the early stages of attack the young growing tips of the bean plants should be removed, as infestation invariably begins at the growing apex of the plant. Where necessary, the plants should be sprayed with a contact insecticide, one containing nicotine being the best for this purpose.

WARBURTON (C.). **Annual Report for 1924 of the Zoologist.**—*Jl. R. Agric. Soc. England*, lxxxv, pp. 442–447. London, 1924. [Received 18th June 1925.]

Injury from insect pests in England was lighter than usual during the year under review. Gout-fly [*Chlorops taeniopus*] was rather numerous on barley, and eelworms on wheat. *Helophorus rugosus* (mud-beetle) is not confined to swampy ground and may attack late-sown turnips, gnawing the roots; it has also been recorded as destroying lettuces following turnips. Weevils of the genus *Sitona* attacked garden peas early, but were later destroyed by the rains. *Cydia nigricana* (pea moth) was unusually abundant. Pupation occurs in the ground. The adults appear in June and oviposit on the blossoms, the young larvae entering the developing pods and attacking the seeds when sufficiently grown to afford food for them to attain maturity. Early peas generally escape. It has been suggested that collecting the haulm and other rubbish, laying it in rows where the infested peas stand and burning it there, will destroy any caterpillars surviving in the pods and the pupae in the surface soil. Occasionally field peas are attacked, in which case deep ploughing is advisable. Celery fly [*Acidia heraclei*] appeared late, but was very abundant. Some bad attacks of asparagus beetle [*Crioceris asparagi*] occurred. The woolly apple aphis [*Eriosoma lanigerum*] was apparently the only Aphid causing any serious damage on fruit trees; the comparative absence of other Aphids, contrasted with their extreme

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abundance in the previous year, was probably due to the heavy rains. The theory that "big bud" in black currants can be cured by firing [*R.A.E.*, A, xii, 144] is still in the experimental stage. The plan of taking green cuttings, which are free from mites [*Eriophyes ribis*] and make remarkable progress when removed and struck, has given good results. Spraying infested plants when the leaves are about the size of a shilling, with winter strength lime-sulphur, does them no permanent injury and checks the mites, another (weaker) spraying as soon as the fruit is gathered being an additional benefit. In several cases furniture or store rooms have been infested by mites, either *Glyciphagus domesticus* or *Tyroglyphus longior*, the former being sometimes very difficult to get rid of.

WALTON (C. L.). **The Agricultural Entomology of North Wales.**—*Proc. Llandudno, Colwyn Bay & District Field Club*, reprint 16 pp. Llanfairfechan. [1925.] [Received 29th June 1925.]

A similar record of the pests occurring in North Wales during the last few years has already been noticed from a fuller report [*R.A.E.*, A, xii, 143].

LYLE (G. T.). **Some Braconidae new to Britain.**—*Ent. Mo. Mag.*, lxi, pp. 118–123. London, May–June 1925.

The species dealt with include *Bracon hylobii*, Ratz., bred from cocoons found in the burrow of some xylophagous beetle, having previously only been recorded from Sweden and Germany, where its host is said to be *Pissodes pini*, L.; and *Apanteles inclusus*, Ratz., which was reared from a larva of *Arctornis chrysorrhoea*, L. (*Porthesia similis*, Fuess.). The cocoons are constructed within those of the host; on the Continent this species has also been reared from *Nygmia phaeorrhoea*, Don. (*P. chrysorrhoea*, auct.).

RYLE (G. B.). *Hylobius abietis*, **L. at Light.**—*Ent. Mo. Mag.*, lxi, p. 131. London, June 1925.

Hylobius abietis, L., is recorded at light at Brighton, where its occurrence is of particular interest as there are no coniferous trees in the neighbourhood, though it is possible that some timber in which this weevil was breeding might have been brought into the town. The belief that new coniferous plantations will be safe from infestation if they are separated by a moderate distance from the breeding-grounds of the beetles thus appears to be incorrect.

MUNRO (J. W.). *Hylobius abietis* **attracted by Light.**—*Ent. Mo. Mag.*, lxi, pp. 161–162. London, July 1925.

The author does not consider that the capture of a few individuals of *Hylobius abietis* at a distance from their normal habitat recorded in the preceding paper is sufficient evidence against the theory that this species does not wander far. In experiments, still in progress, the maximum distance travelled by the weevils was 780 yards, while one weevil had not left a limited area (20 yds. from the point of release) after two years. A male is recorded as having been taken at the Isle of May lighthouse (about 5 miles from the coast of Scotland) in 1913, but the females very rarely use their wings.

SPEYER (E. R.). **Entomological Investigations.**—*Nursery & Mkt. Gdn. Ind. Devpmt. Soc. Ltd. Exptl. & Res. Sta., 10th Ann. Rept., 1924*, pp. 82–104. Cheshunt, Herts, 1925.

Further investigations regarding the hibernation of *Tetranychus telarius*, L. (red spider) [*R.A.E.*, A, xii, 430] have shown that the mites are not liable to be carried into glasshouses from outside in potting and border soil. The hibernating mites can pass the winter in an exposed and active state on banana and carnation plants, where a few that have not turned red lay eggs even at comparatively low temperatures, and these eggs hatch and development is completed slowly. The red forms do not oviposit during the winter even at high temperatures. If suitable plant life is lacking, the red forms congregate in crevices such as door-locks, and especially in bamboo canes, evidently preferring enclosed spaces with a narrow entrance in which to hibernate. They may in such situations obtain some nourishment from the lower forms of plant life, and the fumes of cresylic acid, though not concentrated enough to kill the mites themselves, might destroy this food-supply and thus cause their death. Regular breeding began in January on *Salvia* and *Datura* plants under glass, the first generation resulting almost entirely in red forms, which laid no eggs. On banana plants, oviposition did not begin until March, and after a few generations the mites began to leave the plants, very few remaining in June. At this time, while infestation was severe in cucumber and tomato houses, leguminous plants, such as beans and clover, were the only other plants badly attacked. The mites have been thought to breed largely on elms, but only a few individuals were found on these trees in hedgerows. The mites collected on cucumber, tomato and carnations were again found to be identical. The lengths of the various stages were found to be 5–6 days for the eggs, 2 for the larva, 4 for the nymphal forms and 1 for the adult prior to oviposition ; these closely resemble American records.

Experiments with naphthalene fumigation showed that injury to cucumber plants is likely to result. The leaves of pot-plants insufficiently watered are liable to be scorched, especially if ventilators are kept open after damping. No injury to the flowers was observed. The ripening fruit absorbs the flavour of naphthalene, but quickly loses it again on exposure to fresh air. Heat and light were found to be the two main factors of success in this fumigation. Pure white flake commercial naphthalene in a dry state, which has passed through a sieve of 16 meshes to the inch, should be broadcast by hand on the borders, using 3 lb. to each 100 ft. of border. In leaky houses, the paths, on which excessive moisture is to be avoided, should be treated in the same manner as the borders, using 6 lb. of naphthalene per 100 ft. The temperature of the houses should not fall below 74° F., or rise above 104° F. during fumigation. The borders should be watered and the plants damped over shortly before the naphthalene is applied. It should be broadcast forcibly to ensure wide distribution between 4 and 5.30 p.m., and the ventilators closed for the night. Next morning these should be opened for a few minutes, after which the house should be entered and the plants damped over, care being taken not to wash the naphthalene off the borders. The ventilators are then closed for the day, unless it is necessary to put a little air on to prevent the temperature rising too high. Late in the afternoon the plants should be damped over again and the ventilators closed. By the following

morning the naphthalene should have evaporated. Old leaves should be trimmed off and all fruit cut before fumigation, and if serious scorching appears during the process, the plants should at once be damped over and the naphthalene washed off the borders with a hose. Experiments were tried of vapourising the naphthalene from the hot-water pipes, but this method did not prove practicable. It is thought that some success might be obtained by painting naphthalene on the return pipes of houses where the temperature is under control, but owing to the fact that the temperature at one end of the pipe may differ from that at the other end by more than 10° F., it is not thought that a very regular volatilisation of the naphthalene could be expected. Attempts were made to adapt the naphthalene method to tomato houses, and by using ½ to 1 oz. of naphthalene (16 grade) per square yard at 6 p.m., and keeping the ventilators closed during the next day the mites were killed. The tomato plant is much less susceptible to injury than the cucumber, but the fruit, particularly when ripe, absorbs the taste to a great extent, though this soon disappears on exposure to fresh air. Carnations in pots were successfully treated with ½ oz. 16 grade naphthalene per square yard when the ventilators were closed for a night and a day at temperatures above 74° F.

For winter treatment in cucumber houses, the borders only should be treated, giving two applications as described above for cucumbers, at a 2 days' interval, keeping the house closed for 4 days. This treatment should be repeated a week before the plants are put in at the beginning of the season; in all cases as high a temperature as possible should be maintained. In tomato houses, before removing the plants at the end of the season and one week before planting, naphthalene should be broadcast all over the ground surface of the houses, using 1 oz. per square yard, and the ventilators should be kept closed until the naphthalene has volatilised, but it is essential that the temperature should be well above 70° F. in the houses day and night. It is not thought economically possible to raise the temperature of houses built in blocks sufficiently to attain a concentration of naphthalene vapour strong enough to kill the mites in winter with low temperatures prevailing outside. A treatment for canes that is more economical than boiling them in water is to place them in a steam steriliser with boiler pressure of 50 lb.; at a pressure of 11 lb. in the steriliser all mites in the canes were killed in two minutes. The use of canes in tomato houses is strongly deprecated. As mites congregate in enormous numbers beneath the ridge capping of glasshouses, it is advisable to consider the possibility of dispensing with this capping or of replacing it by some easily removable structure that can be cleaned in winter.

Experiments in the control of woodlice (*Armadillidium speyeri*, Jackson) in cucumber and tomato houses indicate that poison baits may become an economically efficient treatment. The best results were finally obtained by using 90 per cent. coarse oatmeal, 5 per cent. white flour, and 5 per cent. Paris green. The ingredients are thoroughly shaken in a large bottle with a rather wide neck. A hole, half an inch in diameter, is made through the cork when the bait is to be distributed. The bait should not be broadcast over the soil of the boxes, but should be lightly scattered (rather less than 1 oz. per square yard) on the staging; much of the bait falls through to the ground beneath, where it is useful; the seed-boxes are then placed on the bait. This bait has not yet been tested in cucumber houses

with growing plants. Other species of woodlouse killed by this bait are *A. pictum*, Br., and *Porcellio laevis*, Latr., in cucumber houses, and *A. vulgare*, Latr., in tomato houses. *A. speyeri* was observed to breed in cucumber houses for a much longer period than in former years; females with young were found as late as September. The naphthalene treatment described above is fatal to woodlice, but they can escape from it where loose soil or clods of earth provide shelter for them.

PARKER (T.). **Tetrachlorethane. Its Use in Horticulture as a Fumigant for White Fly.**—*Hortic. Trades Jl.*, reprint, 1 p. [*sine loco*], 5th May 1925.

Tetrachlorethane, previously considered too expensive for general use, though an efficient fumigant against whitefly [*Trialeurodes vaporariorum*] [*R.A.E.*, A, x, 285], now costs only 7s. a gallon, as compared with 36s. in 1919. It has been found that a concentration of 2 fl. ozs. per 1,000 cu. ft. is sufficient against *T. vaporariorum* in an airtight house with temperature in the house not below 65-70° F., and the atmosphere on the damp side, if the infestation is not very heavy and the fumigation continues for 8 to 12 hours. Under varying conditions the concentration may have to be increased up to 4 or 5 fl. ozs. per 1,000 cu. ft. As the season advances, higher concentrations are sometimes needed, but the reason for this is unknown. Tetrachlorethane has no effect on Aphids or mites, but at 20 fl. oz. per 1,000 cu. ft. it proved fatal to larvae of the tomato moth [*Polia oleracea*] and mealybugs on vines. The best methods of application are to sprinkle the prescribed amount on to dry sacks hung from wires in the house, or to pour it on to heaps of coke contained in seed boxes placed at intervals along the paths of the house, or to vapourise it by means of suitable lamps. It should not be poured on the paths of the house or sprinkled on borders where chrysanthemums are to be introduced later in the season, as the fumes may remain in the soil. It is not of any use as a soil fumigant as it inhibits plant growth and appears to encourage chlorosis. The effect on different plants in the greenhouse varies. A list, though incomplete, is given of the plants for which the fumigant is satisfactory, uncertain or unsuitable.

SANCTUARY (C. T.). **An Easy Method of eradicating Acarine Disease.**—*Bee World*, vii, no. 1, p. 3. Benson, Oxon., June 1925.

A method of dealing with acarine disease of bees [due to *Acarapis woodi*] that gives great promise of success is to form nuclei from diseased stocks, to rob these nuclei of flying bees, and to strengthen them by the addition of more brood. By this method it is hoped that the old bees will be got rid of or worn out before they reach the infectious stage, and that the disease will gradually abate and finally disappear. A bee is said to begin infecting others about five weeks after becoming infected itself. Anything, therefore, that reduces the life of the bees and anything that removes the majority of flying bees from a colony will prove a severe check to the progress of mites in the colony. An experiment on these lines is described. The new stocks formed were examined after wintering (in April). Fifteen bees from each hive were dissected, 180 in all, and only one infested bee was found. As the old colonies

had contained from 50 to 90 per cent. of infested bees, it seems that the mite had been eradicated in practically every case. No sprays or disinfectants of any kind were used ; the treatment costs nothing, and can be carried out equally well on a large or small scale.

WERTH (E.). **Die Zwetschen- oder Kirschblütenmotte und ihre Bedeutung für die verschiedenen Steinobstarten.** [The Plum and Cherry Blossom Moth and its Importance in the case of different Varieties of Stone Fruit.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 6, p. 51, 1 fig. Berlin, 1st June 1925.

Counts made in the experimental orchard of the Biological Institute at Dahlem, Berlin, showed the following percentages of infestation by *Argyresthia ephippiella*, F., in developed blossoms : Plum, from 0 to 3, according to the variety ; peach, 8 ; various types of cherry, 8-50.

Auftreten von Kiefernspanner und Kiefernspinner in Baden. [The Occurrence of *Bupalus piniarius*, L., and *Dendrolimus pini*, L., in Baden.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 6, p. 52. Berlin, 1st June 1925.

With reference to the reported occurrence of the pine moth, *Bupalus piniarius*, L., in Baden [*R.A.E.*, A, xiii, 300], much damage to pines, amounting sometimes to defoliation, was done in spring by this pest. *Dendrolimus pini*, L., also occurred in such numbers that banding was resorted to in the most heavily attacked stands.

BLUNCK (H.). **Lebensweise und Bekämpfung der Drahtwürmer.** [Life-history and Control of Wireworms.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 76, 4 pp., 4 figs. Berlin, May 1925.

This is a brief account of wireworms and of the various methods adopted against them both in the larval and adult stages.

BLUNCK (H.). **Lebensgewohnheiten und neuzeitliche Bekämpfung der Kohlfliege.** [Life-history and modern Methods of Control of the Cabbage Fly.]—*Der deutsche Erwerbsgartenbau*, no. 16, reprint, 3 pp., 7 figs. Berlin, 1925.

Notes are given on the life-history of *Phorbia brassicae* and on its control by the usual methods, including that of tarred paper collars, the technique of which is illustrated from a Dutch source already noticed [*R.A.E.*, A, vii, 230].

RUSZKOWSKI (J.). **Szkodniki roslin uprawnych wedlug materjalow i obserwacyj Stacji Ochrony Roslin T.O.W. w Warszawie, z r. 1920.** [Pests of Cultivated Plants during 1920.]—*Choroby i szkodniki roślin*, 1925, no. 2, reprint, 22 pp. Warsaw, 1925.

This list of insect pests is compiled from observations made at the Phytopathological Station in Warsaw during 1920, and is arranged according to the crops attacked.

Nowicki (S.). **Description d'une nouvelle espèce du genre** *Copidosoma* **Ratz. (Hym., Chalc., Encyrt.), de Pologne, parasitant une chenille nuisible** (*Blastodacna putripennella*, **Zell.**).—*Polskie Pismo ent.*, iv, pt. 2, pp. 83–91, 2 figs. Lemberg, 1925.

Copidosoma woronieckae, sp.n., has been reared from the larva of *Blastodacna putripennella*, Zell., which attacks the buds and young stems of fruit trees in Poland.

Nunberg (M.). **Masowy pojaw Brudnicy nieparki** (*Lymantria dispar* **L.) w okolicy Bochni w r. 1924.** [The Abundance of *Porthetria dispar*, L., near Bochnia in 1924.]—*Polskie Pismo ent.*, iv, pt. 2, pp. 118–133, 1 map. Lemberg, 1925.

An account is given of the infestation by *Porthetria dispar*, L., near Bochnia in 1924, as a result of which a temporary laboratory was started by American entomologists for the study of the parasites of this moth [*cf. R.A.E.*, A, xii, 171; xiii, 251]. In this particular locality *P. dispar* is chiefly a pest of orchards and of various shade trees along the roads; it is only occasionally found in pine forests. Of the 11 parasites reared, *Meteorus versicolor*, Wasm., *Hemiteles areator*, Grav., and *Gordius* sp. had not been previously recorded.

Strawinski (K.). **Historja naturalna korowca sosnowego** *Aradus cinnamomeus*, **Pnz. I.** [Life-history of *Aradus cinnamomeus*, Pnz. I.]—[*Ann. Sci. agric. & forest.*] xiii, pp. 644–693, 4 figs., 4 pls. Posen [1925]. (With a Summary in English.]

Aradus cinnamomeus, Pnz., occurs throughout Poland, wherever its chief food-plant, *Pinus sylvestris*, is present. It has also been taken on *P. banksiana* and *P. rigida*, but never on *P. nigra*. In exceptional cases it has been found on *Larix* and *Picea excelsa*. Though the attack does not kill the trees, they are weakened, and their growth checked. Trees up to 20 and 25 years of age are attacked. The bug chooses a suitable spot, such as cracks in the dead bark, where it can pierce the underlying soft bark in order to reach the subcortical tissue from which the juice is sucked. It has been found by the author on the branches and trunk, but never on the needles. It hibernates on the ground among the fallen needles or on the tree trunk about 8 inches from the ground. Both larvae and adults hibernate. The eggs are laid between April and July. The first larvae hatch towards the end of May, feed throughout the summer and autumn and go into hibernation in the middle of November. They are not mature until the following June, the total life-cycle thus lasting 2 years.

Voukassovitch (P.). **Sur la Biologie de** *Goniozus claripennis* **Först. parasite d'***Oenophthira pilleriana* **Schiff. (Hymenoptera.)**—*Bull. Soc. Hist. nat. Toulouse*, lii, 1924, no. 3–4, pp. 225–246, 10 figs. Toulouse, 20th March 1925.

Goniozus claripennis, Först., after temporarily paralysing a larva of *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., lays its eggs in the skin. Should the host moult, as occasionally happens, before they hatch, they are discarded with the skin. The parasite is itself attacked by various Chalcids.

PERRIER DE LA BATHIE (E.). **La Faune des Orgues.**—8vo, 52 pp., 2 pls. Ugine (Savoie), published by the author, March 1925.

This paper deals with the fauna associated in any way with organs ; the part dealing with insects is practically identical with one previously noticed [*R.A.E.*, A, xi, 166].

MARTINET (G.). **Le Criocère de l'avoine.**—*La Terre vaudoise*, xvii, no. 23, p. 340. Lausanne, 6th June 1925.

Crops of young oats are almost always attacked in Valais by a small species of *Crioceris* and its larva. After hibernating in the soil, the insect attacks the young leaves ; at the beginning of May the larvae appear and bore through the green part of the leaves. In June a second generation attacks the leaves and panicles. Barley, wheat and rye are not infested, so that they may be planted in succession to oats. This beetle probably lives on neighbouring grass land. A solution with a nicotine or arsenical basis is recommended for its control, coupled with the use of a fertiliser of rapid action, so as to increase the vigour of the crop.

MARIÉ (P.). **Le puceron du rosier.**—*Bull. Soc. Agric. France*, lvii, no. 1, pp. 14–15. Paris, January 1925.

Rose trees are attacked by two species of Aphid, *Macrosiphum* (*Aphis*) *rosae*, and *Myzus* (*A.*) *rosarum*, the former infesting the stems and the latter the leaves of the plant. In both species the first generation is composed of apterous parthenogenetic females only, which can produce 30-40 living young. Winged parthenogenetic females are produced amongst the third or fourth generations, and are the founders of fresh colonies, which repeat the life-cycle of the first colony. At the end of summer oviparous females and small winged males are produced. The oviparous females, after fertilisation, deposit winter eggs, from which the first generation of apterous parthenogenetic females hatch the following spring. A spray of 3 lb. soft soap, 2 lb. methylated spirit, and 10 gals. rain water is recommended, to be applied as often as fresh colonies appear. Frequent applications may be made without causing injury to the plant.

COUSTON (F.). **La tétrachlorure de carbone pour la destruction des Charançons.**—*Jl. Agric. prat.*, xliii, no. 24, pp. 477–478. Paris, 13th June 1925.

A description is given of the successful use of carbon tetrachloride on stacks of wheat that had become infested with weevils, whilst stored at the docks.

FAES (H.). **Emploi du pyrèthre contre la Cochylis et l'Eudémis.**—*C.R. Soc. Agric. France*, lvi, pp. 106–114. Paris, 1925.

The bulk of this information on the use of pyrethrum and other measures against the vine moths [*Polychrosis botrana* and *Clysia ambiguella*] has already been noticed from another source [*R.A.E.*, A, xiii, 301].

MOREAU (L.). **Sur les difficultés de traiter l'Eudémis dans les vignobles septentrionaux.**—*C.R. Soc. Agric. France,* lvi, pp. 115–118. Paris, 1925.

Whereas *Clysia ambiguella*, Hb., has almost disappeared in the western districts of France, *Polychrosis* (*Eudemis*) *botrana*, Schiff., has been rapidly on the increase since 1920. Daily countings by means of bait traps were made in order to ascertain the relative importance of its generations, their stages and duration, with a view to determining the most favourable time for the application of insecticides. The measures of control practised during 1923 and 1924 are discussed, the former being a year when flight was very prolonged and the latter when flight was short and the hatchings occurred very close together. It is only under the latter circumstances that successful control of *P. botrana* is possible. When the flight of the moths in spring is prolonged, treatments against the resulting larvae have to be too numerous to be worth while, and, as soon as the young grapes are covered with leaves, treatment cannot be successfully carried out. In some cases in a single generation, following a prolonged flight period, some of the larvae have reached the pupal stage when the others are only just hatching.

BERNÈS (J.). **Les éphippigères dans le Var.**—*Progr. agric. & vitic.*, lxxxiii, no. 25, pp. 595–597. Montpellier, 21st June 1925.

Vines, fruit trees and crops in the department of Var are attacked by various Orthoptera, including *Ephippiger provincialis*, Yers, *E. terrestris*, Yers, *Barbitistes fischeri*, Yers, and *B. berenguieri*, May. Control measures include burning in woods and on bare land at authorised times, the clearing of brushwood in March or April on the edges of woods, the destruction of infested hedges and bushes round cultivated fields and the use of various insecticides. Of these, the most satisfactory is a bait prepared by mixing 100 lb. sawdust and 5-8 lb. arsenic with a solution of 1 gal. molasses in 2 gals. water. When the undergrowth is badly infested, spraying with a 10-15 per cent. solution of sulphuric acid in water should be employed. In vineyards collecting by hand is resorted to, though this is slow and costly. On very young vines with no grapes and others before flowering a spray of 10-20 lb. lead arsenate (diplumbic by preference) in 100 gals. of a copper sulphate solution, such as Bordeaux, may be used. Good results were also obtained by spraying with a solution of copper arsenite, 5 lb. per 100 gals., or 10 per cent. pyrethrum-soap. Turkeys were found to feed freely on the insects. Scattering of insects previously poisoned by a lead arsenate solution proved effective, as *Ephippiger* attacked the dead bodies and became poisoned. A 15-20 per cent. solution of cresyl and an oil emulsion were also used against the immature swarms. Fruit trees should be sprayed with lead arsenate before the flowers fall.

Fruit Fly Surveys in Spain, Portugal and Italy.—*Service & Regulatory Announcements. U.S. Dept. Agric., Fed. Hortic. Bd.*, no. 82, pp. 18–20. Washington, D.C., May 1925.

Investigation in July 1924 showed the Mediterranean fruit-fly [*Ceratitis capitata*] to be definitely established in various fruits in

nine fruit-growing districts of Spain, resulting in the prohibition of importation of Almeria grapes into the United States [*cf. R.A.E.*, A, xii, 123 ; xiii, 330].

In Portugal a similar investigation has shown that apples are seriously infested with codling moth [*Cydia pomonella*], and that the olive fruit-fly [*Dacus oleae*] is prevalent. Vine infestation by *Clysia ambiguella*, was slight. The cherry fly, *Rhagoletis* (*Tephritis*) *cerasi*, appeared early in June, and *C. capitata* apparently infests peaches, apricots and oranges.

C. capitata was also recorded from various districts in Italy.

[Tarnani (I. K.).] **Тарнани (И. К.). Инструкция по борьбе с важнейшими вредителями сахсельхозов.** [Instructions for the Control of the more Important Pests.]—**Станция Защиты свеклы при Харьковском Отд. Сахаротреста** [*Kharkov Beet Prot. Sta.*], 32 pp. Kharkov, 1924. [Received 1st July 1925.]

This bulletin is intended to assist in the identification and control of the more important pests, chiefly insects, of the various crops and fruit trees in the Kharkov Government. It is purely a popular account, no scientific names being given.

[Arkhangelski (P. P.).] **Архангельский (П. П.). Новые данные по биологии восточного листоеда** (*Agelastica orientalis* **Baly**). [New Information on the Biology of *A. orientalis*, Baly.]—*Défense des Plantes*, ii, no. 1, pp. 2–4. Leningrad, April 1925.

The distribution of *Agelastica orientalis*, Baly, in Turkestan is given. The chief food-plants are poplar, willow and almond, but the larvae also feed on apple. Attacks on apple are the result of planting poplars and willows around the orchards ; by discontinuing this practice, the damage may be greatly reduced. Some of the beetles do not emerge from pupation until the following spring, though the majority appear in the summer and hibernate in cracks in the ground or under the bark of stumps. A soft soap spray [*R.A.E.*, A, ii, 714] may be successfully used against the larvae on almond and apple.

[Gorski (V. F.).] **Горский (В. Ф.). К биологии капустной мухи** (*Chortophila* **или** *Delia brassicae* **Bouché) и мерам борьбы с нею.** [*Phorbia brassicae* and its Control.]—*Défense des Plantes*, ii, no. 1, pp. 4–8. Leningrad, April 1925.

The oviposition of *Phorbia* (*Chortophila*) *brassicae* and the development of the egg are described. The females show a preference for certain varieties of cabbage and always choose the strongest plants for oviposition. Fewer eggs were found to be laid on plants surrounded by manure containing a lot of straw, and though not affording complete protection, plants surrounded by straw only showed a 4 per cent. infestation, as against 60 per cent. on the untreated plots. Chopped straw (about $1\frac{3}{4}$ in. lengths) should be placed around the plant close up to it at the time of planting out, immediately after watering, about a handful to each plant being sufficient. Tests with mercury bichloride (1-1,000) at the rate of $10\frac{1}{2}$ oz. per plant gave satisfactory results.

[Baranov (N. I.).] **Баранов (Н. И.). Заметки по морфологии саранчевых.** [Notes on the Morphology of Acrididae.]—*Défense des Plantes*, ii, no. 1, pp. 8–9. Leningrad, April 1925.

In 1923 the author observed amongst a swarm of *Dociostaurus maroccanus*, Thnbg., in Montenegro numerous individuals that differed from the usual form by their smaller size, larger head and eyes, longer antennae and hind legs. This form probably represents the solitary phase of the species, or, at least, a transition towards it.

[Arkhangelski (P. P.).] **Архангельский (П. П.). Об изучении фауны вредных насекомых Туркестана.** [The Study of Injurious Insects of Turkestan.]—*Défense des Plantes*, ii, no. 1, pp. 10–12. Leningrad, April 1925.

Notes are given on the distribution in other parts of the world of various insect pests that occur in Turkestan.

[Pliginski (V. G.).] **Плигинский (В. Г.). Озимая совка** (*Euxoa segetum* **Schiff.) в 1924 году в Курской губернии.** [*E. segetum* in the Kursk Government in 1924.]—*Défense des Plantes*, ii, no. 1, pp. 12–15. Leningrad, April 1925.

Euxoa segetum, Schiff., occurred in such abundance during 1924 in the Kursk Government that systematic collection had to be organised on a large scale. The chief damage was done to sugar-beet. *Feltia* (*Agrotis*) *exclamationis*, L., *Barathra* (*Mamestra*) *brassicae*, L., *Scotogramma* (*M.*) *trifolii*, Rott., and *Leucania l-album*, L., were only found as isolated individuals.

[Shtchegolev (V.).] **Щеголев (В.). Пашенная совка** (*Hadena secalis* **L.) в Череповецкой и Вологодской губерниях.** [*Trachea secalis* in the Tcherepovetz and Vologda Governments.]—*Défense des Plantes*, ii, no. 1, pp. 53–54. Leningrad, April 1925.

Trachea (*Hadena*) *secalis*, L., occurred in unusual abundance in the Tcherepovetz and surrounding districts during 1923, causing considerable injury to winter sown rye. The eggs are found in chains at the beginning of September near the leaf sheath ; in captivity they hatch in about a week. Hibernation probably occurs in the larval stage in nature. Immature larvae are found in the stems in June, the portion above the point of attack soon withering. Pupation occurs in the surface soil close to the last stem attacked, the pupal stage lasting from 20 to 28 days. The first pupa was found on 21st June.

[Pliginski (V.).] **Плигинский (В.). Заморозковая листовертка в Курской губ.** [*Exapate congelatella*, Cl., in the Kursk Government.]—*Défense des Plantes*, ii, no. 1, pp. 54–55. Leningrad, April 1925.

The Tortricid moth, *Exapate congelatella*, Cl., was recorded as injuring apples in Russia in 1916 ; it had previously only been known to attack the leaves of currant. The eggs are laid singly near the buds and hibernate ; the larvae emerge in spring and feed on the opening buds and later on the young leaves. In the late spring they

descend to a lower part of the tree and pupate under the bark. Bands like those used for *Cydia pomonella*, L., applied at the beginning of June, are recommended.

[Pliginski (V.).] **Плигинский (В.). Некоторые наблудения над озимым червем.** [Some Observations on Cutworms.]—*Défense des Plantes*, ii, no. 1, p. 55. Leningrad, April 1925.

During the autumn of 1924 it was noticed that fully grown cutworms migrating from one field to another had to cross a field of knot-grass (*Polygonum*). They fed on the leaves, but soon gave up feeding and remained on the soil surface in a weakened condition for 2 to 4 days, after which they apparently revived and crawled to the neighbouring field. *Polygonum* is apparently, therefore, noxious to cutworms, though not fatal to them.

Beckwith (C. S.). **Control of the Cranberry Girdler by submerging in Water.**—*New Jersey Agric. Expt. Sta.*, Bull. 411, 14 pp., 1 fig. New Brunswick, N.J., February 1925.

The method of controlling *Crambus hortuellus*, Hb. (cranberry girdler) devised by Scammell [*R.A.E.*, A, vi, 10] has proved to have certain drawbacks under New Jersey conditions, in consequence of which the present investigation was undertaken in the hope of discovering a method that would conserve the late water supply (required for frost protection) without interfering with picking the cranberries at the optimum time. As the adults emerge over an extended period in New Jersey and begin to oviposit soon after emergence, any spray to be effective would require application every 3 days for a period of 21 days, which would not ordinarily be practicable. Flooding the bog is of no use against the adults, as the moths oviposit while floating; the eggs sink and, when the water is removed, they hatch. Flooding during the larval period (in early August) caused the larvae to come to the surface in less than 12 hours. The floating larvae, carried out of their natural environment, and exposed to their numerous enemies (especially birds), rapidly disappear, and any held under the water by mechanical means die within 24 hours. As partly wet berries proved very susceptible to scorching by the sun, it was found better to remove the water during the night, thus allowing the fruit to dry before the direct rays of the sun struck the bog. A tendency to fungus rot in the fruit after flooding was largely reduced by spraying with Bordeaux mixture 4 : 4 : 50 just before and just after the flooding.

Fleming (W. E.). **The comparative Value of Carbon Bisulphide and other organic Compounds as Soil Insecticides for Control of the Japanese Beetle** (*Popillia japonica*, **Newm.**).—*New Jersey Agric. Expt. Sta.*, Bull. 410, 29 pp. New Brunswick, N.J., February 1925. [Received 16th June 1925.]

A study has been made of 46 selected organic compounds, carbon bisulphide being used as a standard, to determine which is the best adapted to the treatment of soil about the roots of nursery stock for the destruction of immature stages of *Popillia japonica*, Newm. (Japanese beetle). It was necessary to consider the individuality of each compound and its relation to the soil processes, the development

of the insect and the plant species. The compounds were grouped according to the minimum weights necessary to produce a larvicidal vapour in a closed chamber at 26·7° C. (80° F.). An attempt was made to correlate the physiological action of a compound with its physical properties or its chemical constitution and thus expedite the selection of the insecticide, but so many variable factors intruded that no clear conclusion could be drawn. As a result of their ability to evolve toxic vapours, the following compounds were selected for further tests : Benzyl chloride, phenol, o-cresol, naphthalene, nicotine, o-toluidine, paradichlorobenzene, sodium cyanide, nitrobenzene, aniline, o-nitrotoluene, hexachlorethane, bromobenzene, carbon bisulphide, m-cymene and chlorobenzene. Each of these compounds, producing the most toxic vapours, was dispersed in water and tested for its larvicidal action as a contact insecticide, but it was found that carbon bisulphide and naphthalene were the only ones that could safely be used to destroy infestation in the soil about the roots of growing plants, and of these the former is the better adapted for the purpose.

Leach (B. R.) & Johnson (J. P.). **Emulsions of Wormseed Oil and of Carbon Disulfide for destroying Larvae of the Japanese Beetle in the Roots of Perennial Plants.**— *U.S. Dept. Agric.*, Dept. Bull. 1332, 17 pp., 2 figs. Washington, D.C., May 1925.

This is a detailed account of observations already noticed [*R.A.E.*, A, xii, 397]. American wormseed oil is distilled from the entire cultivated plant of *Chenopodium ambrosioides anthelminticum* ; it is soluble in 8 volumes of 70 per cent. alcohol, and varies in specific gravity from 0·955 to 0·980 at 25° C. The chemical composition of the oil is described, the principal and primarily active ingredient being ascaridole ($C_{10}H_{16}O_2$). The concentration of the dip should be figured in terms of ascaridole rather than in terms of wormseed oil. Of the various emulsifiers tested, caustic potash fish-oil soap proved the most satisfactory, provided that the undiluted soap was first mixed with the oil; this produced a miscible oil that mixed with water and gave a perfect emulsion. The time required for emulsification depends on the concentration of the soap. The best emulsion was obtained in the following proportions : 10 cc. soap, 20 cc. oil, and 10 cc. water. There is an optimum proportion of soap, above which a marked separation of the soap from the emulsion occurs on standing, and below which the mixture either fails to emulsify or breaks up immediately after emulsification. Owing to the great variation in the emulsifying powers of different brands of soap or even different batches of the same brand, the use of oleic acid and sodium or potassium hydroxide is recommended, the best results being obtained with 20 cc. oil, 0·4 cc. acid and 12·6 cc. hydroxide.

When larvae of *Popillia japonica*, with no soil present, are immersed for 6 hours in a wormseed-oil dip the concentration of which is equal to 0·5 cc. of ascaridole to 3 litres of water, the larvae are killed, provided the temperature of the dip is maintained between 65° and 70° F. The temperature of the dip must not be allowed to fall below 65° F. during the treatment, and it is advisable to maintain it at 70° F.

Longer periods of submergence are required to kill the larvae inside the plants owing to the fact that the soil round the roots absorbs some of the toxic material. It is recommended that Japanese iris (*Iris kaempferi*) and *Sedum* be immersed for 15 hours and perennial phlox

for from 9 to 18 hours, depending on the amount of soil in the roots. These periods provide ample margins of safety to ensure mortality of the larvae and do not affect the plants.

The old-style resin fish-oil soap was found to be one of the best emulsifiers for carbon bisulphide. A stock solution may be prepared by adding 12·5 grms. of the soap to 87·5 cc. of water, heating until dissolved and allowing the solution to cool ; 20 cc. of this stock solution are added to 50 cc. of carbon bisulphide and agitated until the ingredients emulsify. When added to water the emulsion disperses evenly and remains in suspension indefinitely. Should this soap not be available, a good emulsion may be made by mixing 0·5 cc. of oleic acid with 20 cc. of carbon bisulphide and adding sodium or potassium hydroxide until the solution is about neutral to phenolphthalein, about 10 cc. of the hydroxide usually being required. The carbon bisulphide emulsions are recommended for peony roots from the point of view of cost. The plants should be immersed for 15 hours in a concentration equal to 9·5 cc. of carbon bisulphide (emulsified) to 1 litre of water. The same limitations of temperature apply as in the use of wormseed oil emulsion.

During 1922 and 1923, 45,000 plants, valued at £2,000, were satisfactorily treated with these emulsions.

WHITING (A. R.). **The Inheritance of Sterility and of other Defects induced by abnormal Fertilization in the Parasitic Wasp, *Habrobracon juglandis* (Ashmead).**—*Genetics*, x, pp. 33–58, 1 pl. Baltimore, Md., January 1925.

The contents of this paper on *Microbracon* (*Habrobracon*) *juglandis* are indicated by its title.

ROHWER (S. A.). U.S. Bur. Ent. **Description of a New Sawfly Injurious to Jack Pine.**—*Proc. Ent. Soc. Washington*, xxvii, no. 5, pp. 115–116. Washington, D.C., May 1925.

Neodiprion banksianae, sp.n., has been reared from larvae feeding on *Pinus banksiana* in Minnesota.

HERRICK (G. W.). **Notes on some little known Thrips (Thysanoptera).**—*Ent. News*, xxxvi, no. 6, pp. 180–183, 2 fig. Philadelphia, Pa., June 1925.

What appears to be *Taeniothrips orionis*, Treh., is recorded from Colorado on *Aquilegia coeruleum*. *Liothrips vaneeckei*, Priesn., has been found on *Lilium canadense* in New York, where it does damage to lily bulbs in a manner similar to that recorded in Holland. *Parthenothrips dracaenae*, Helger, has been found breeding on leaves of *Anthurium* and banana plants in a greenhouse.

URBAHNS (T. D.). **Curb Pests and try for Quality Fruit.**—*Better Fruit*, xix, no. 12, p. 7. Portland, Oregon, June 1925.

It has been estimated that approximately £2,000,000 worth of fruits alone are destroyed annually by insect pests in California in spite of the fact that almost an equal amount is spent on material,

equipment and labour in fighting them. The need for thorough and efficient spraying is pointed out, and the difficulties arising are briefly discussed.

[**Notes on Pests.**]—*Ohio Agric. Expt. Sta. 43rd Ann. Rept. 1923–24*, Bull. 382, pp. 34–37. Wooster, Ohio, 1924. [Received 6th July 1925.]

Numerous remedies have been tested against *Anuraphis persicae-niger* (black peach aphis), which destroys young peach trees as soon as they are set in the orchard and seedlings in the nursery before they are budded. Paradichlorobenzene shows the most promise, but tobacco dusts proved entirely useless. *Prociphilus* (*Trama*) *erigeronensis* (aster root aphis) only overwinters in the nests of ants and not on the roots of its various food-plants. Nicotine sulphate (40 per cent.) should be poured round the roots of asters, the formula recommended is 1 to 1½ teaspoonsfuls of nicotine sulphate, 1 oz. soap (dissolved) and 1 U.S. gal. water. Experiments on the date of planting in relation to infestation by the European corn borer [*Pyrausta nubilalis*] indicate that late planted crops of sweet or field maize may be grown without serious injury; in this connection dent maize gave most promise of being adapted to seasonal planting. The results of work on artificial control indicate that burning unused parts of the crop is the most efficient measure.

The Mexican bean beetle [*Epilachna corrupta*] has been found in Southern Ohio [*cf. R.A.E.*, A, xii, 54] on all kinds of beans, including soybeans [*Glycine hispida*] and cowpeas. Dusting has given good results, provided that the machinery used is designed to throw the material against the lower side of the leaves. Three applications at 14-day intervals, beginning when the plants are about 2 weeks old, are usually sufficient, though four or five may be needed under certain conditions. In heavy infestations the applications should be made at 10-day intervals.

Houser (J. S.). **The Japanese Beetle.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, x, no. 3–4, pp. 44–49, 5 figs. Wooster, Ohio, March-April 1925.

Owing to the possibility of *Popillia japonica*, Newm. (Japanese beetle) becoming established in Ohio, its various stages and life-history are briefly described, so that it may be more easily recognised. A list is given of the food-plants.

Hadley (C. H.). **The European Corn Borer in Pennsylvania.**—*Pennsylvania Dept. Agric.*, Circ. 2, 12 pp., 3 pls., 3 figs. Harrisburg, Pa., February 1925. [Received 6th July 1925.]

So far, *Pyrausta nubilalis*, Hb. (European corn borer), though apparently increasing its distribution in Pennsylvania, has not yet become established in the major maize-growing districts of the State. Its various stages and life-history and the usual measures for its control are described. The importance of preventing its further spread is pointed out.

CATHCART (C. S.) & WILLIS (R. L.). **Analyses of Materials sold as Insecticides and Fungicides during 1924.**—*New Jersey Agric. Expt. Sta.*, Bull. 407, 16 pp. New Brunswick, N.J., November 1924. [Received 16th June 1925.]

This bulletin gives the results of examination of samples of insecticides and fungicides collected during the year 1924, and inspected under the Act to Regulate the Sale of Insecticides, 1912.

PETERSON (A.) & STEARNS (L. A.). **A Preliminary Report on the Oriental Peach Moth in New Jersey.**—*New Jersey Agric. Expt. Sta.*, Circ. 175, 11 pp., 7 figs. New Brunswick, N.J., March 1925.

A serious outbreak of *Cydia* (*Laspeyresia*) *molesta*, Busck (oriental peach moth) occurred throughout the New Jersey orchards in 1923. Peaches are the preferred food-plant, though quince, apple, pear, cherry, plum and other stone-fruits are also attacked. Adults begin to emerge from the cocoons early in May; the eggs are laid on the lower surface of the foliage in the case of peach, and on other fruit-trees on the smoother surface of the foliage. They hatch in a few days, and the larvae enter the tender growing terminals of the peach twigs; after the growth of the twigs has ceased the larvae may leave them and attack the fruit. The larvae of the later broods may enter the fruit directly. The attack on the twigs causes the terminal leaves and shoots to wilt and eventually to turn dark and die. The attack on the fruit is more serious. The larvae usually enter the side of the peach early in the season; the later broods enter near the stem end or through the green stem. The infestation of fruit may vary from 5 to 80 per cent., the late varieties generally suffering most. Under the most favourable conditions the larva is full grown in 10 to 15 days; it then emerges from the twig or fruit and spins a cocoon. The time spent in the cocoon varies with the temperature from 11 to 14 days in midsummer, whilst the late summer and autumn broods remain in the cocoon throughout the winter. During the summer the entire life-cycle from egg to adult occupies four or five weeks. In 1924 there was a partial fourth generation in New Brunswick. During the dormant season the cocoons may be found on the tree or away from it; when on the tree they are most abundant on the trunk near the ground; the majority, however, hibernate away from it. In summer cocoons may also be found on the fruit or in crotches of the tree. The larvae in the cocoons on or near the tree trunk may be killed by the application of paradichlorobenzene as used against the peach tree borer [*Aegeria exitiosa*, Say]. Other remedial measures advocated have already been noticed [*R.A.E.*, A, xiii, 253].

Spray Calendars for Apples and Quinces, and Peaches.—*New Jersey Agric. Expt. Sta.*, Circs. 173 & 174, 4 & 4 pp., 4 figs. New Brunswick, N.J., 15th February 1925.

These spray schedules for New Jersey supersede those previously noticed [*R.A.E.*, A, xii, 363].

MELANDER (A. L.). [**Miscellaneous Pests and their Control.**]—*34th Ann. Rept. Washington Agric. Expt. Sta. 1923–24*, Bull. 187, pp. 46–52. Pullman, Wash., December 1924. [Received 19th June 1925.]

The results of spraying against the orchard leaf-roller [*Tortrix argyrospila*] on apples in Washington State in 1924 show that lubricating oil sprays succeed in killing over 95 per cent. of the eggs. The lighter oils proved better than those of medium or heavy viscosity, killing as many as 98·8 per cent. of eggs. Oil sprays should contain 8 per cent. of actual oil. A small number of eggs are sure to escape even under the best conditions and may cause some loss of fruit. Lead arsenate alone cannot be depended upon, as much of the injury is done by caterpillars before the spray becomes effective. Three applications were made, the first in the pre-pink stage of blossom buds, the second when the petals had fallen, and the third as the first cover spray for codling moth [*Cydia pomonella*]. Strengths of 4, 6, or 8 lb. lead arsenate per 100 U.S. gals. were equally effective, and the addition of a calcium caseinate spreader did not increase the efficiency.

The best emulsifier for making miscible oil proved to be cresoap, a liquid containing 45 per cent. of cresylic acid and 55 per cent. of potash fish-oil soap. The best results against *T. argyrospila* in 1924 were obtained with a miscible oil consisting of 91 per cent. of neutral lubricating oil and 9 per cent. of cresoap. Cresoap is also the best emulsifier for concentrated stock emulsions when water is soft. Non-soap emulsifiers are best for hard water; they produce a yellowish, coarse-grained and relatively unstable emulsion. Calcium caseinate, glue or eggs serve best for emulsifiers and can be used at the rate of 2 lb. or more to 50 U.S. gals. of oil.

Experiments were made to determine the amount of volatile poisons required to saturate a given quantity of soil and the subsequent rate of killing of buried insects. Poison gas was generated by passing air through the poison; the air was then drawn by means of an aspirator through a glass cylinder of soil at the exit of which were placed some bean-weevils as a living indicator and a jar of absorbing reagent as a chemical indicator. When slowly passed through the series of tubes the poison vapour would first be taken up by the soil, and after the saturation point was reached would show on the two indicators. Carbon bisulphide penetrated soil very rapidly, passing through the tube of soil almost as fast as though the tube were empty; carbon tetrachloride took twice as long; ammonia vapour was largely withheld owing to the great absorbing power of moisture for this gas. Phenol was not volatile enough to allow a toxic concentration, requiring hours to saturate the soil with the fumes. Air passed through sodium cyanide for half a day had no effect on the weevils owing to stability of the cyanide as well as to absorption by the soil. With calcium cyanide a silver nitrate indicator showed emergence of gas in 3 or 4 minutes, and the beetles were dead in 28 minutes. On the basis of loss in weight of calcium cyanide during the experiment, 700 lb. was computed as necessary to saturate the soil and fill the pore spaces per acre foot. In the field this method was combined with baiting, so as to obviate the necessity of treating every foot of ground. On one area where wireworms were particularly destructive, single rows of seed (peas or maize) were drilled into the ground in early spring. When the seeds sprouted they attracted the wireworms,

whereupon granulated calcium cyanide was drilled over the rows of seed. This treatment was very effective and might well be adapted to the dry land regions where the crops have not been important enough to warrant a general chemical treatment.

Pests recorded for the first time in Washington include *Crioceris asparagi* (asparagus beetle); *Anasa tristis* (squash bug); *Rachela bruceata* (Bruce's measuring worm); *Stilpnotia salicis* (satin moth), which is doing great damage to willows and poplars; *Rhagoletis cingulata* (cherry maggot); *Hoplocampa cookei* (cherry sawfly); *Gracilaria syringella* (lilac miner) and *Forficula auricularia* (European earwig).

Among the most destructive insects in 1924 were the codling moth [*Cydia pomonella*]; San José scale [*Aspidiotus perniciosus*], for which the sprays used (containing 2 per cent. oil) were frequently too weak; sugar-beet leaf-hopper [*Eutettix tenella*]; Colorado potato beetle [*Leptinotarsa decemlineata*]; and false chinch bug [*Nysius ericae*].

UNDERHILL (G. W.). **Woolly Aphis Investigations. Effect of delayed Planting on Infestation of Apple Seedlings.**—*Qtrly. Bull. Virginia State Crop Pest Commiss.*, vii, no. 1, pp. 1–7, 5 figs. Blacksburg, Va., April 1925.

Apple seedlings planted for budding usually become infested with *Eriosoma lanigerum*, Hausm. (woolly aphis) during the first season, both in the tops and roots, the infestation being due to the winged forms migrating from the American elm [*Ulmus americana*]. In Virginia, this migration generally lasts from about 10th May to 1st June, so that seedlings planted at the usual date in early spring are exposed throughout the entire migration period, and both tops and roots are seriously infested by 1st June. Seedlings were, therefore, kept in cold storage during 1924 till as late as 19th May and 5th June, when they were still dormant and in good condition. They were planted immediately after removal from storage and grew normally, though the later plantings were smaller at the end of the season. In early November the roots were examined for infestation, and it was found on comparison with seedlings planted early in May that a delay of two weeks in planting reduced the percentage of severely injured roots from 27 to 2, and the total spring infestation from 34 to 5. A delay of four weeks resulted in no trees with severely injured roots and only 0·7 per cent. with a moderately heavy infestation. While infestation of the roots during the second and third seasons after planting is believed to be much less heavy than during the first, a satisfactory remedial measure for the following one or two seasons that the roots are in the nursery is not yet known.

HEADLEE (T. J.) & RUDOLFS (W.). **Some further Facts relative to the Principles underlying the Making and Use of Nicotine Dust.**—*New Jersey Agric. Expt. Sta.*, Bull. 400, 44 pp., 20 figs. New Brunswick, N.J., August 1924. [Received 16th June 1925.]

Since the authors' previous paper [*R.A.E.*, A, xii, 31] further observations have been made on the evolution of nicotine gas from dusts under field conditions and its effects on *Illinoia* (*Macrosiphum*) *pisi*, and also on the influence of temperature, relative humidity, size of particle of the carrier and thickness of nicotine layer on the

particles. For the field tests a special apparatus had to be constructed, details of which are described. The dusts were applied with a Leggett traction duster at the rate of 45 lb. per acre on rows of peas that were in practically full blossom. Three nicotine dusts were used: Ground magnesium limestone (dolomite) impregnated with sufficient free nicotine to insure a $1\frac{1}{4}$ per cent. actual nicotine content, and "black leaf F_1" and black-leaf F_2," guaranteed $1\frac{1}{4}$ and 2 per cent. actual nicotine content respectively. An extremely rapid delivery of nicotine gas is more effective than one that is slower but longer continued. A temperature of 70° F. or higher is necessary to promote a rapid evolution of nicotine gas from the dusts under field conditions; below this point evolution decreases, and at 50° F. there is practically no evolution whatever. The escape of the gas from the free-nicotine dolomite dust is materially more rapid than from the "black-leaf" products. At 70° F. or above, free nicotine dolomite dust, even when applied at the rate of 50 lb. per acre, evolves practically all of its nicotine in 6 hours. The great bulk escapes in the first three hours. One of the factors involving retardation or acceleration of nicotine evolution from a dust carrier is the size of its particles, the gas escaping more rapidly from coarse material; the ordinary 100-mesh dolomite gives about the average evolution. The fact that under certain conditions, especially with high temperatures, sulphur and nicotine dust is equal to or better than hydrated lime and nicotine dust might be explained by the difference in structure or compactness of the particles. The thickness of the film of nicotine on the particle makes a difference in the rate of nicotine gas evolution, and within limits thinner films give off gas more rapidly. High atmospheric moisture appears to retard nicotine evolution. Under semi-arid conditions free nicotine appears to be far more effective than nicotine sulphate.

The percentage of kill and percentage of reduction of the Aphids vary with the rate of evolution of nicotine gas; when the rate of gas evolution is practically constant, the use of higher-content dusts is likely to be followed by a higher percentage of kill and reduction, because the charge in the atmosphere about the insects is greater.

FAWCETT (G. L.). **El mosaico o enfermedad de las rayas amarillas de la Caña.** [Mosaic or yellow stripe Disease of the Sugar-cane.]—*Rev. Indus. y Agric. de Tucumán*, xv, no. 7–8, pp. 103–111. 1925. (Abstract in *Rev. App. Mycol.*, iv, pt. 6, p. 378. Kew, Surrey, June 1925.)

With the exception of certain immune sugar-canes of eastern origin, all the varieties cultivated in the Argentine are attacked by mosaic. The disease appears to be transmitted only by *Aphis maidis*; experiments with Jassids proved negative. The selection of resistant varieties is regarded as the only practical means of control.

TRAVASSOS (L.). **Quelques Nématodes du** *Gryllotalpa*.—*C.R. Soc. Biol.*, xciii, no. 21, pp. 140–141, 5 figs. Paris, 19th June 1925.

Two Nematodes, *Binema binema*, gen. et sp. n., and *B. ornata*, sp. n., are described from *Gryllotalpa* at Angra dos Reis, Rio de Janeiro.

DE COSTA LIMA (A.). **Notas sobre o *Stephanoderes seriatus* Eichhoff.** [Notes on *S. seriatus*.]—*Bol. Minist. Agric. Ind. e Comm.*, xiv, nos. 2–3, pp. 194–199, 365–368. Rio de Janeiro, February–March 1925.

The Scolytid beetles described as *Stephanoderes polyphagus*, *S. fallax*, and *S. largipennis* [*R.A.E.*, A, xiii, 54, 88] have proved to be identical with *S. seriatus*, Eichh. The female bores into red or black coffee-berries and penetrates in the space between the beans, ovipositing there. It feeds on the tissue enveloping the beans and sometimes bores to a depth of a few millimetres into a bean, the perforation being always on the flat side of the bean. *S. seriatus* also infests somewhat withered oranges, entering near the peduncle. Both fallen and hanging fruits are thus infested, and the larvae that hatch within the fruits pupate there. Bondar has found it in dead cacao fruits. In January 1925 an inspector found some old coffee bushes infested by *S. seriatus* and reported that it mines and causes the death of the upper twigs. Examination of this material revealed mines along the medullary regions, and one mine contained eggs. As two of the co-types of the coffee twig miner described by Campos Novaes as *Xyleborus cofeicola* [*R.A.E.*, A, xi, 25] are also *S. seriatus*, the larvae recorded by him are probably those of this species.

DA COSTA LIMA (M.). **Sobre o caruncho do café (*Stephanoderes coffeae*, Hag.).** [On the Coffee-berry Borer, *S. hampei*, Ferr.]—*Chacaras e Quintaes*, xxxi, nos. 1–3, pp. 16–19, 141–143, 226–227. S. Paulo, January–March 1925; continued in *Bol. Minist. Agric. Ind. e Comm.*, xiv, no. 3, pp. 368–374. Rio de Janeiro, March 1925.

These notes review the distribution of *Stephanoderes hampei*, Ferr. (*coffeae*, Haged.), its oviposition, development, means of spread and natural enemies, and the injury it causes.

BALLARD (E.). **Third Entomological Progress Report (Australia).**—*Empire Cotton Growing Rev.*, ii, no. 3, pp. 237–240. London, July 1925.

A short account is given of the situation respecting insect pests in the cotton areas in Queensland in December 1924. In the Central Districts infested with *Platyedra gossypiella* (pink bollworm), the infestation is heavy and has just spread to the ratoon cotton. A close season was not enforced, the date by which all cotton had to be out of the ground or cut down having been extended to December, so that finally no close season was kept. Only one heater was available for treating seed, and as this was near Brisbane, seed from all areas had to be brought there, involving risk of carrying infection on the way. The next attack of *P. gossypiella* will probably, therefore, be a heavy one. It is suggested that two more machines for treating the seed should be established. An insect at first thought to be *Dichocrocis punctiferalis* (peach moth), and not yet identified, is present throughout the cotton areas, and last year did much damage. The larvae eat the terminals first and early in November leave them for the squares. A Braconid parasite has been reared, and it is hoped that this and other parasites may keep the pest in check, but a bad attack may occur in late January or early February. *Heliothis* (*Chloridea*) *obsoleta* caused a light attack on cotton in some districts,

but where there was maize in the vicinity, it was preferred and cotton escaped. Careful cultivation and the use of trap-crops will probably reduce the injury by this moth. Dusting is, however, being experimented with, in case, in a dry year, it should be impossible to plant maize in time. In the present season, tomatos, wild Cape gooseberry [*Physalis*] and maize are all attacked, while cotton is largely free. *Tectocoris banksi* (Harlequin or Chinese bug) is being studied, chiefly with regard to the part it plays in the transmission of internal boll rots. The overwintering adults appear on cotton by October and November, and in the more northerly districts oviposit early in October on standover cotton and wild *Hibiscus*. The eggs are heavily parasitised. *Dysdercus sidae* and *Homoeocerus* sp. both attack the squares and bolls; the former is present on Malvaceous plants and in standover cotton, but has hardly appeared on plant cotton yet; the latter is largely parasitised in the egg stage. *Aphis gossypii* began attacking cotton early in October, but was checked by parasites and predators. *Earias huegeli* (rough boll worm) does some damage to terminals and squares, but is not yet a serious pest; caterpillars of another moth, *Crocidosema* (*Eucosma*) *plebeiana*, damaged the terminals of ratoon cotton for a time.

UNION OF SOUTH AFRICA. **Orchard Cleansing Act.**—9 pp. Pretoria. 1925.

This Act provides for the compulsory cleansing of orchards in respect of insect pests and plant diseases.

BODENHEIMER (F. S.). **On Predicting the Development Cycles of Insects. i.** *Ceratitis capitata*, **Wied.**—*Bull. Soc. R. ent. Egypte*, 1924, nos. 2–4, pp. 149–157. Cairo, 1925.

The development of an insect has, until recently, been considered in direct relation to the surrounding temperature only. W. D. Pierce has lately worked out the relation to the combination of surrounding temperature and air humidity. For a few of the most important insects in medical entomology the experimental data have been determined, but in agricultural entomology nothing has previously been done in relation to the effect of humidity, temperature only being considered. The theory that the product of temperature in degrees centigrade and time of development in days is constant proved to be wrong, but has recently been corrected by Blunck, whose formula is: "The product of duration of development and the difference between the surrounding temperature and the critical cold-point is constant." The time of development in relation to the surrounding temperature forms an equilateral hyperbola. If for each of two temperature points of this hyperbola the corresponding duration of development is known, it is possible to construct the whole hyperbola, and for any other temperature point between the critical heat and cold-point the corresponding duration of development is known. This rule is illustrated by examples from the seasonal history of *Ceratitis capitata*. From data from Hawaii and Italy it is known that the duration of development is 20 days at 26° C. and 41·7 days at 19·5° C. With these facts it is possible to construct the equilateral hyperbola. The critical cold-point for *C. capitata* is 13·5° C.; the application of the hyperbola to the countries that are, or may be, infested by the fly is shown in

tables. At Plymouth, for example, the development of the summer generation would last from mid-June to the beginning of October, but the temperature of the first half of June (16·8° C.) is not sufficient, considering the average temperature of 8·1° C. in the other months, to make possible a winter generation. The acclimatisation of the fly in England is therefore practically impossible. In sub-tropical and tropical countries where, from spring till autumn, all stages of the fly are found together, it is impossible to fix the development data exactly to the day; it is only possible to give an opinion on the most likely possibilities of development of *C. capitata* under given climatic conditions, and thus to provide a good basis for observations. The countries infested with *C. capitata* may be classed as those where permanent acclimatisation is impossible (as in England); those where the fly is permanently established, but where the continuation of generations is interrupted by a duration of development of at least 100 days in the winter generation, and those where the generations follow each other without interpolation of a winter generation (that is, where the average temperature is never below 13·5° C.). The possible application of Blunck's rule in other cases should be examined, for if its usefulness were proved, it would afford a very important and simple basis on which to work in any country.

Banana Cultivation in the Canary Islands.—*Bull. Imp. Inst.*, xxiii, no. 2, pp. 168–174, 4 pls. London, July 1925.

Banana plantations in the Canary Islands are often infested by a mealybug, *Pseudococcus comstocki*, which is protected by ants. The practice of leaving the old leaves as a mulch tends to harbour the mealybug, and the burning of them seems to be advisable. In the larger plantations spraying is carried on with a mixture of creosote, nicotine, petroleum and soap. The larva of a small moth, *Hieroxestis subcervinella*, has given some trouble by boring into the fruit stalk. No effective control method, except extraction by hand, is known.

The Plants (Injurious Pests) Ordinance, 1923.—Order, no. 23, 1 p. typescript. Accra, 18th May 1925.

The banana, plantain and all other representatives of the genus *Musa* are "declared plants" in the Gold Coast under this Ordinance [*R.A.E.*, A, xii, 112].

Vayssière (P.) & Mimeur (J.). **Au sujet des Pucerons, Ennemis du Cotonnier, du Mil et du Sorgho en A.O.F.**—*Agron. colon.*, no. 88, pp. 121–152, 5 figs. Paris, April 1925.

In French West Africa the cotton aphis, *Aphis gossypii*, Glov., occurs on cotton, *Hibiscus cannabinus* and *H. esculentus*. On cotton the colony is founded by a winged female, which appears with the first leaves. From July to October, the apterous females live from 25-30 days, and are able to produce young after about a week. In October life is shorter and reproduction less. The Aphids pass the dry season in very small groups, and occasionally as isolated individuals, beneath the leaves of cotton plants and *Hibiscus*. During this period not only does reproduction decline, but the individuals remain for a

relatively long period in the first larval stage. When the Aphids are numerous they cause swelling and discolouration of the stems, and sometimes defoliation, especially on young imported cotton plants, and even arrest the development of the plant. The capsules have a tendency to open prematurely. The Aphids also cause the formation of a honey-like substance that obstructs the pores and constitutes a favourable medium for the development of a black fungus, *Capnodium* sp., which weakens the plant.

Contact insecticides, such as nicotine or pyrethrum, may be recommended, and it is of the greatest importance to clean and work all land under cultivation, and to destroy during the winter all growth likely to harbour *A. gossypii*, especially perennial *Hibiscus*.

A. sorghi, Theo., and *A. maidis*, Fitch, are to be found in abundance from January to April, both occurring on *Sorghum*, and the latter also on millet [*cf. R.A.E.*, A, ii, 396, 630]. Only two females of *A. maidis* were found on maize. The growth of the plants is retarded, and the infested stems are stunted. Attempts to breed *A. sorghi* on cotton were not successful. As a general rule, migration of the winged form seems to increase the prolific power of apterous females. The winged female lives about 20 days and produces about 40 larvae. One apterous female from these larvae will give rise to 60 descendants, whereas after 4 successive apterous generations a female will scarcely produce 30-35 larvae in the same time.

As a result of infestation by these Aphids a sticky coating is formed on the leaves of *Sorghum* and millet similar to that produced on cotton by *A. gossypii*. A colony of Aphids causes the exudation on the reverse side of the leaf of fine drops of liquid, which spreads over the whole surface of the stem and trickles down. Rapid evaporation concentrates the liquid, and the parts affected are finally coated with a viscous or solid covering. The loss of sap is sometimes considerable, and the soil around may be glazed for several square yards. This loss of liquid, in addition to that absorbed by the insects, causes the withering, and sometimes the death, of the young shoots. The insects are particularly prejudicial to *Sorghum* cultivated during the dry season on the large areas that are submerged when the river Senegal rises. These districts are sown in November as soon as the river falls, when the harvesting of millet is not finished. It would be possible to avoid or to diminish the attack from other regions by preventing the overlapping of the two crops. For this it would be necessary to make use during the rainy season of quick-growing varieties that could be harvested before the beginning of the fall of the river. It is also necessary to burn all stalks, leaves and stumps of millet, *Sorghum* and maize existing outside the flood area before sowing.

These three Aphids are held in check by a certain number of parasites and predators, and the cultivation of *Leptadenia lancifera* is recommended around the crops of millet and *Sorghum*, as it is the food-plant of another Aphid, *Siphonophora leptadeniae*, Vuill., which has some of the same natural enemies [*R.A.E.*, A, ii, 588]. In addition to those previously recorded these include the Coccinellids, *Chilomenes* (*Cydonia*) *lunata*, F., *Adonia variegata*, Goeze, *Hyperaspis senegalensis*, Muls., only recorded in French West Africa, *Scymnus ornatus*, Sicard, and *S. soudanensis*, Sicard. The larvae and pupae of these Coccinellids often harbour Hymenopterous parasites, including *Tetrastichus* sp., *Pachyneuron* sp., and *Homalotylus flaminius*, Dalm.

Dipterous parasites of the Aphids include an Agromyzid, *Leucopis* sp., and the Syrphids, *Paragus borbonicus*, Macq., and *Xanthogramma aegyptium*, Wied. These two Syrphids are parasitised by the Hymenoptera: *Bassus laetatorius*, F., var. *senegalensis*, Ferr., *Callaspida ligurica*, Gir., recorded for the first time in tropical Africa, and, possibly, *Pachyneuron longiradius*, Silv.

Appendices to this paper contain descriptions of the Coccinellids, *Scymnus* (*Nephus*) *ornatus*, sp. n., and *S.* (*Sidis*) *soudanensis*, sp. n., by Dr. A. Sicard, and of the Braconid, *Rhogas mimeuri*, sp. n., by Dr. Ferrière, which was found associated with the Syrphids, though it is doubtful whether it is really a parasite of them.

Vayssière (P.) & Mimeur (J.). **Les Orthoptères nuisibles au Cotonnier et autres cultures en A.O.F.**—*Agron. colon.*, no. 89, pp. 203–224, 2 pls. Paris, May 1925.

The necessity of a knowledge of all the more common species of Acrididae in a given locality is emphasised by the authors, who maintain that a large proportion of observations on the economically important species must be accepted with caution, because of uncertain, or evidently incorrect, determinations.

An example of this is provided by numerous records of *Schistocerca gregaria*, Forsk., from French West Africa. All the swarms examined in 1922 and 1923 and believed to be that species, proved to consist of *Anacridium moestum melanorhodon*, Walk., while not a single specimen of *S. gregaria* was found.

A list of the more common Acrididae of the country is given, with descriptions and figures, to enable field entomologists to recognise the species. The economic status of most of them remains unknown, except for *Zonocerus variegatus*, L., which damages various palms (especially young *Elaeis*), Liliaceae (particularly *Dracaena*), croton, coffee, cacao, *Hevea*, and various vegetables. Two crickets are also mentioned, *Brachytrypes membranaceus*, Drury, which damages young cotton plants, and *Gryllotalpa africana*, P. de B.

A review of various generally accepted methods of controlling locusts is appended.

Poutiers (R.). **Les Insectes de l'Olivier.**—*Rev. Bot. appl. & Agric. colon.*, v, nos. 44 & 45, pp. 257–265 & 358–366, 7 figs. Paris, 30th April & 31st May 1925.

A brief account is given of the bionomics of the principal pests of olive in the Mediterranean countries, comprising upwards of 50 species, with notes in some cases on their parasites and control.

Beille (L.). **Les Stephanodères sur les Caféiers cultivés à la Côte d'Ivoire.**—*Rev. Bot. appl. & Agric. colon.*, v, no. 45, pp. 387–388. Paris, 31st May 1925.

The coffee-berry borer, *Stephanoderes hampei*, Ferr., is causing considerable losses on the Ivory Coast, where it was first recorded in 1922. The insect first of all attacked the Quillon, and then the Robusta varieties of coffee, but up till now Liberia coffee has remained immune. It was observed that this variety was covered with red ants, and it is possible that they protect it from attack. The first

appearance of *S. hampei* coincided with the destruction of the forest. Applications of Bordeaux mixture yielded no results. At the present time the fallen berries are being gathered and the plantations kept clean.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, x, no. 6, pp. 478–481, 1 fig. Pretoria, June 1925.

A new and as yet unidentified insect, the larvae of which destroy locust eggs, has been found at Bulwater. The larvae of *Clytanthus hottentotus*, Olv., caused serious injury to stumps of buchu [*Barosma*] in the Cape Province. It is thought that the distortion of oranges occurring in Natal may possibly be due to the mealybug, *Pseudococcus filamentosus*. Sodium fluoride prickly pear bait [*R.A.E.*, A, xiii, 39] has proved successful against cutworms and reduced the number of millipedes causing serious damage in strawberry beds. According to Dr. L. B. Ripley, of the various baits tried against *Pterandrus rosa*, a common fruit-fly in Natal, the most attractive were the Mally and pollard baits [*cf. R.A.E.*, A, i, 195; xii, 411]. The pollard bait becomes more attractive as the degree of fermentation increases and was used without lead arsenate. *Papilio demoleus* occurred in large numbers during March in the Sundays River Valley, causing serious injury to the foliage of young citrus; hand collection proved effective.

Worral (L.). **A Jassid-resistant Cotton.**—*Jl. Dept. Agric. Union S. Africa*, x, no. 6, pp. 487–491, 3 figs. Pretoria, June 1925.

This is a continuation of a previous paper [*R.A.E.*, A, xi, 528]. Though all the American Upland cotton grown in South Africa has a certain resistance against the attacks of *Empoasca* (*Chlorita*) *facialis*, Jac., no variety has been found to be absolutely immune. A variety received from India is described, and though it is too early to predict the behaviour of this cotton under all the varying conditions found in the cotton belt of South Africa, it is hoped that it may prove of value, as it at least has the necessary resistant qualities.

Storey (H. H.). **Sugar-cane Diseases of the Mosaic Type in South Africa. Part ii.**—*Jl. Dept. Agric. Union S. Africa*, x, no. 6, pp. 532–537, 2 figs., 2 pls. Pretoria, June 1925.

Though uba cane appears to be immune from mosaic disease [*R.A.E.*, A, xii, 469], it exhibits a condition that in many respects closely resembles mosaic. It is known as streak disease and is most obvious in the early stages of growth of the plant, the shoots having a fan-like appearance owing to lateral growth and crowding of the leaves. The final yield of sugar from the cane is diminished. The plants never recover from the disease, and all sets taken from them produce diseased plants. All attempts to secure any kind of direct transfer of streak disease from diseased to healthy cane have failed. It has been proved, however, that the disease may be transmitted by the leafhopper, *Balclutha mbila*, Naude, which has been shown to transmit the disease from maize to maize [*R.A.E.*, A, xii, 468; xiii, 111]. The only means of preventing the disease is to plant clean setts.

Woods (B.). **Report of the Director of Agriculture, Southern Rhodesia, for the Year 1924.**—Fol., 12 pp. Salisbury, 1925.

Most of the work of the entomological department has been directed against the locust invasion which occurred in February. Altogether, 3,726 locust spray pumps were used, and 21,975 gallons of poison were issued, in addition to some 12 tons of dry sodium arsenite. The campaign proved entirely successful, and much information has been gained that will serve should another outbreak occur in the future.

Wolff (M.), Krausse (A.) *et al.* **Forleule** (*Panolis flammea*, **Schiff.**) [The Pine Moth] ; **Lebensweise, Ueberwachung und Bekämpfung des Grossen Waldgärtners** (*Blastophagus piniperda* **L.**) [The Life-history, Observation and Control of the Large Pine Beetle *Myelophilus piniperda*] ; **Lebensweise, Ueberwachung und Bekämpfung des sogenannten Kleinen Waldgärtners** (*Blastophagus minor* **Hartig.**) [The Life-history, Observation and Control of the Smaller Pine Beetle, *Myelophilus minor*) ; **Ueber die Bekämpfung von Forstschädlingen mit Arsenpräparaten vom Flugzeug aus.** [On Combating Forest Pests with Arsenicals applied from Aeroplanes) ; **Nonne** (*Lymantria monacha* **L.**) [The Nun Moth.]—*Forstl. Flugblätter, Minist. Landw., Domänen u. Forsten*, nos. 1–5, 7 pp., 1 col. pl. ; 9 pp., 7 figs. ; 5 pp., 3 figs. ; 4 pp. ; 13 pp., 1 col. pl. Neudamm, 1924. [Received 26th June 1925.]

The text of circulars nos. 1-3 and 5 are divided according to the months of the year, and for each month information is given on the development and habits of the above pests and the measures to be taken. No. 4 is published in view of the fact that experiments in treating forest areas with arsenicals from aeroplanes are to be carried out in Germany. It is intended to refute popular objections and to instruct the public as to the dangers, real and imaginary, in connection with the work.

Wünn (H.). **In Elsass-Lothringen vorkommende Schildlausarten. (5. Mitteilung.)** [Coccids occurring in Alsace-Lorraine. (5th Communication.)]—*Zeitschr. wiss. Insektenbiol.*, xx, no. 5–6, pp. 114–124, 2 figs. Berlin, 15th June 1925.

This list of Coccids gives a full record of localities in which they have been found and of the plants on which they were taken. A previous list has already been noticed [*R.A.E.*, A, ii, 98].

Prell (H.). **Zur Biologie eines bisher verkannten Kieferneulenschmarotzers.** [A Contribution to the Biology of a hitherto unrecognised Parasite of the Pine Moth.]—*Zeitschr. wiss. Insektenbiol.*, xx, no. 5–6, pp. 137–147, 6 figs. Berlin, 15th June 1925.

The morphology of the Braconid, *Microplitis decipiens*, sp. n., is described. This species, of which biological characters only were previously recorded [*R.A.E.*, A, xiii, 317], is a parasite of the half-grown larva of the pine moth [*Panolis flammea*], but is of no practical importance on account of its rarity.

Prell (H.). **Die Trichterrolle des Ahornblattrollers. Biologisches und Taxonomisches über einen sehr bemerkenswerten Rüsselkäfer.** [The Funnel-leaf-roll of the Maple Leafroller. Biology and Taxonomy of a very remarkable Weevil.]—*Zeitschr. Morph. Oekol. Tiere*, Abt. A, iii, pp. 685–703, 4 figs. Berlin, 1925.

It is possible to divide the weevils of the sub-family Rhynchitinae according to their method of leaf-rolling, and, therefore, by examining leaf-rolls to recognise any variation in their makers. The leaf-roll of *Rhynchites* (*Deporaus*) *iristis*, F., differs from those so far known for this subfamily. A new genus, *Chonostropheus*, is therefore erected for it.

Wolff (M.) & Krausse (A.). **Die Forleule, ihre Lebensweise und ihr verderblicher Frass.** [The Pine Moth, its Life-history and harmful Feeding.]—*Der Heger*, iv, no. 15, pp. 515–522, 12 figs. Breslau, 14th April 1925.

This is a popular account of *Panolis flammea*, Schiff.

Gasow (H.). **Der grüne Eichenwickler** (*Tortrix viridana* **Linné**) **als Forstschädling. Ein monographischer Versuch.** [The Green Oak Tortrix, *T. viridana*, as a Forest Pest. A monographic Attempt.] —*Arb. Biol. Reichsanst. Land- u. Forstw.*, xii, no. 6, pp. 355–508, 8 pls., 3 figs. Berlin, May 1925.

This paper gives a historical survey of the literature on *Tortrix viridana*, L., and describes the outbreaks that have taken place—especially in Westphalia, where this moth is the chief pest of oaks. The influence of weather conditions on outbreaks, the morphology and biology of *T. viridana*, the question of a second annual generation, and natural enemies are discussed. As regards remedial measures, the conclusion reached is that stomach poisons, properly applied, afford a practical means of control. A bibliography of 217 references is given.

Blunck (H.) & Janisch (R.). **Bericht über Versuche zur Bekämpfung der Rübenaaskäfer im Jahre 1923.** [Report on Experiments in combating Silphid Beetles on Beet in 1923.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 5, pp. 433–496, 10 figs., 2 pls. Berlin, April 1925. [Received 22nd June 1925.]

In this report on further investigations [*R.A.E.*, A, xi, 435], the biology and harmfulness of *Blitophaga opaca*, L., in Pomerania, and the measures to be taken against this Silphid are discussed in detail. The adult is polyphagous. In spring young grasses are chiefly attacked if other green food is absent. Barley and oats are preferred to rye and apparently also to wheat. These are soon abandoned for sugar-beet, and other root-crops. Crucifers, carrots, and potatoes suffer occasional injury.

Tests with liquid and dust insecticides show that some of the latter, such as calcium arsenate, are useful against *B. opaca*. In the absence of special apparatus the dust may be distributed by dragging gauze-bottomed bags along the rows of plants. About 6 lb. of an arsenical dust per 2½ acres will reduce infestation by 50 per cent., while four

times the amount almost entirely checks an attack. Preventive treatment is best applied by means of poison-baits, which have the advantage of being usable before the beetles begin reproduction, beet heads dipped in a solution of sodium arsenate proving very satisfactory. Cultural methods do not appear to have any practical value.

KAUFMANN (O.). **Die Weissährigkeit der Wiesengräser und ihre Bekämpfung.** [The White Ear of Meadow Grasses and its Control.] —*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 5, pp. 497–567. Berlin, April 1925. [Received 22nd June 1925.]

This is an exhaustive report on the occurrence of the condition known as white ear in meadow grasses in Pomerania. The economic losses due to this are considerable in Germany, and in one instance an estimated loss of £4,000 in grass seed occurred in one locality.

The regular occurrence of white ear is almost exclusively due to attack by Arthropods, chiefly mites, of which the most important is *Pediculopsis graminum*, Reut. This mite, as well as *Tarsonemus spirifex*, March., and *T. culmicolus*, Reut., both of which are highly injurious, occurs throughout the year on growing grass. Various insects that contribute to the occurrence of white ear include thrips and flies such as *Oscinella frit*, L.

Meadows used for pasture in autumn or in spring up to mid-May have been found to remain free. Even more effective results were obtained by manuring with potash and ground basic slag with the addition of crude calcium cyanamide. As these manures are very beneficial to the grasses, their use affords an ideal solution of the problem.

The mites that are chiefly responsible migrate during the year from early ripening grasses to those that sprout late, and as a rule white ear is most severe where this change is rendered easy. Species of *Poa* and *Agrostis* are preferred by the mites and should not be grown mixed with other grasses, or even, if possible, at the same time as them.

SCHARNAGEL (—). **Untersuchungen über die Beschädigung verschiedener Hafersorten durch die Fritfliege.** [An Investigation on the Injury to various Varieties of Oats by the Frit-fly.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiii, no. 5, pp. 569–580. Berlin, April 1925. [Received 22nd June 1925.]

Experiments made in 1922 with nine varieties of oats show that injury by the frit-fly [*Oscinella frit*] is not the same in all cases. Immediately after the completion of this report, Kleine's paper on the same subject was published [*R.A.E.*, A, xi, 341], and with one exception the same results were reached in both investigations.

STELLWAAG (F.). **Die Massenbewegung der Traubenwickler im Verhältnis zur Witterung.** [Variations in the Abundance of Vine Moths in Relation to Weather.]—*Anz. Schädlingsk.*, i, nos. 5–6, pp. 52–54, 63–64. Berlin, 1925.

Although over 100 Hymenopterous parasites of the vine-moths, *Clysia* (*Conchylis*) *ambiguella*, Hb., and *Polychrosis botrana*, Schiff., are known in Central Europe, their effect is negligible. In the

Palatinate scarcely 0·5 per cent. of the moths are attacked. Fungi infesting the pupae are somewhat more effective, but physical factors are those really responsible for variations in abundance of the moths.

The adults of *C. ambiguella* are nocturnal, and their flight-period, which is favoured by moist heat, is uninterrupted if suitable nights are numerous in spring and summer. Long periods of rain and cold cut short the flight. Excessive warmth and dryness are unfavourable, especially in July, when the second generation occurs. The eggs also cannot stand excessive dry heat, and newly-hatched larvae are killed in 4–5 hours by strong sunshine. The pupae that occur in summer are not likely to be affected, but many winter ones perish from unknown causes, though they can withstand severe cold.

P. botrana is a twilight species that often flies by day. Moist heat promotes mating. The eggs are destroyed by great heat, and it is on this fact that the practice of defoliation is based. The larva can resist heat better than that of *C. ambiguella*, as its greater mobility enables it to seek refuge rapidly. German vineyards, which are about at the northern limit of the grape-vine, offer the best conditions for *C. ambiguella*, whereas *P. botrana* is better suited in the south. It occurs, for instance, in Algeria, where *C. ambiguella* cannot exist.

JABLONOWSKI (J.). **Ueber Luzernengallen.** [On Lucerne Galls.]—*Anz. Schädlingsk.*, i, no. 6, pp. 61–62. Berlin, 1925.

Very little is known about the galls that occur on lucerne and their economic importance. In 1924, two Cecidomyiid flies, *Dasyneura ignorata*, Wachtl, and *Contarinia* (*Jaapiella*) *medicaginis*, Kieff., were observed on lucerne in Germany [*R.A.E.*, A, xii, 437, 515]. The former produces shoot galls and the latter bud galls. In Hungary, in the same year, the author investigated fruit galls due to another Cecidomyiid, *Asphondylia miki*, Wachtl. These galls also contained parasites and hyperparasites of the fly, which is, however, not considered of economic importance.

EIDMANN (H.). **Kiefern- und Heidekrautspannerpuppe.** [The Pupae of the Pine and Heather Moths.]—*Anz. Schädlingsk.*, i, no. 6, pp. 64–65, 1 fig. Berlin, 1925.

While the pine-moth, *Bupalus piniarius*, L., is a serious forest pest in Germany, the species closely related to it are not harmful. *Hematurga atomaria*, L., is, in fact, considered useful as a destroyer of heather. In the pupal stage these two species are difficult to distinguish, and as the pupae are often found together, they are briefly described. *H. atomaria* has two generations a year, in April-May and June-September. It is parasitised to a greater extent than *B. piniarius*, but apparently by different parasites.

SPESSIVTSEFF (P.). **Barkborrefaunan å Siljansfors försökspark i Dalarna.** [The Bark-beetle Fauna of Siljänsfors' Experimental Park in Dalecarlia.]—*Skogsförsöksanst. Exkursions-Ledare*, x, 52 pp., 34 figs. Stockholm, 1925. (With a Summary in English.)

Of the 33 species present, 30 live in pine or spruce, the remainder attacking birch and alder. A list is given of the species, with illustrations of their galleries and notes on their occurrence and importance.

Some observations seem to prove that *Pityophthorus micrographus*, L., *P. trägårdhi*, Spess., and *Cryphalus saltuarius*, Wse., require two years to complete their life-cycle.

BLATTNY (C.). **Het voorspellen van het massaal optreden van schadelijke insecten.** [The Prediction of an Outbreak of injurious Insects.]—*Tijdschr. Plantenziekten*, xxi, no. 6, pp. 139–144, 1 fig. Wageningen, June 1925.

Careful observation by entomological experts can enable a fairly accurate forecast to be made as to the extent of an impending occurrence of a given insect. Natural enemies of the hop aphis, *Phorodon humuli*, are of considerable value in checking this pest in Czecho-Slovakia, and their study helps in estimating the probable infestation.

PETERSEN (W.). **Lepidopteren-Fauna von Estland (Eesti).** [The Lepidopterous Fauna of Esthonia.]—8vo, Teil I & Teil II, pp. 1–316, 317–590. Reval, *Bildungsministerium des Freistaates Eesti*. 1924. [Received 24th July 1925.]

This second, enlarged edition of the "Lepidopteren-Fauna von Estland" (1902) is an annotated list including some species of economic importance.

MALENOTTI (E.). **I quartieri d'inverno dello** "*Pseudococcus vitis*" **Nied.** [The Winter Quarters of *P. vitis*.]—*Pagine Agricole*, nos. 4–5, reprint, 20 pp., 7 figs. Leghorn, April-May 1925.

New information has been gained regarding the winter quarters of *Pseudococcus vitis*, Nied., which is a pest of vines in Tuscany [*R.A.E.*, A, xiii, 4]. It now appears that this Coccid, on the Tuscan Coast at least, always hibernates above ground. On the vine it hibernates under the more or less detached strips of bark on the stem and older branches and under the cortical fibres where these have been loosened. The preferred refuge of the mealybug is in the canes of *Arundo donax*, commonly used as vine stakes. Here it occurs in fissures in the leaf-sheaths, in the internodal chambers into which the Bostrychid beetle, *Micrapate xyloperthoides*, Duval, has bored, and in the brood-galleries abandoned by this beetle. The female mealybug oviposits in these shelters at the end of the winter. Many mealybugs drop to the ground when the stocks are being scraped in winter, and all débris from scraping should be collected on sheets and destroyed. Canes used as stakes should be cleared of the leaf-sheaths, and immediately bore-holes appear in them they must be burnt and replaced by sound canes, preferably of *Arbutus unedo* or *Erica arborea*, which are less subject to attack by borers. After the stocks have been cleaned, they must be washed with an insecticide solution.

SCHELLENBERG (H.). **Zur Bekämpfung des Sauerwurms.** [Controlling the Second Generation of the Vine-Moths.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxiv, no. 13, pp. 233–235. Frauenfeld, 27th June 1925.

The second generation of the vine-moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] may be combated both in the egg and

larval stages. No time should be lost once the flight of the adult has been observed. Nicotine is the chief contact poison used, stomach poisons not being considered safe. Once the grape berries have attained a fair size, spraying is ineffective, and the collection of infested berries must be resorted to.

CHEVALIER (L.). **Etude sur la Biologie et la manière de vivre d'un Diptère mangeur d'Orthoptères :** *Bigonichaeta setipennis,* **Fall. ; Biologie et manière de vivre de** *Psammophila arenaria,* **F., Hyménoptère mangeur de Chenilles ; Note sur deux Hyménoptères, mangeurs de Larves de Sauterelles ; Un mangeur de Criocères, le** *Cerceris quinquefasciata,* **Rossi ; Nouvelle observation sur** *Mydaea uliginosa,* **Fall.**—*Bull. Soc. Sci. Seine-&-Oise,* ser. 2, v, no. 1, pp. 16–19 ; no. 2–3, pp. 34–41 ; no. 5, pp. 73–77, 77–80 & 80–81. Versailles, 1924.

The Tachinid, *Digonochaeta* (*Bigonichaeta*) *setipennis,* Fall., common in the neighbourhood of Paris, is a parasite of *Forficula auricularia,* L. There are three generations a year, the largest number of flies being seen in the first half of July. The adult lays an egg on an earwig, and the larva, on hatching, feeds inside the host. When only the skin is left, the larva leaves it and pupates. *D. setipennis* is itself parasitised by the Chalcid, *Dibrachys boucheanus,* Ratz.

The Sphegid, *Psammophila arenaria,* F., is recorded as preying upon the larvae of *Euxoa* (*Agrotis*) *segetum,* L. Its life-cycle occupies about 9 months.

Tachysphex nitidus, Koll., and *T. pectinipes,* L., are recorded as useful predacious enemies of grasshoppers.

The Sphegid, *Cerceris quinquefasciata,* Rossi, is predacious on *Crioceris asparagi,* L. Its larvae are themselves attacked by *Myiobia pumila,* Macq.

Mydaea uliginosa, Fall., is a parasite of various household pests, such as *Dermestes lardarius,* L.

CHEVALIER (L.). **Note sur la Biologie et la manière de vivre de** *Piophila casei* **L., la Mouche du Fromage.**—*Bull. Soc. Sci. Seine-&-Oise,* ser. 2, v, no. 4, pp. 63–65. Versailles, 1924.

The adults of *Piophila casei,* L., appear in France in July and in October, and, therefore, during these months at least, all cheeses should be well covered. Another fly infesting cheese, especially Camembert, is *Fannia canicularis,* L.

LAPAZARÁN Y BERISTAÍN (J. C.). **La plaga de la Langosta en la Región Aragonesa (Decenio 1914-1924).** [The Locust Pest in the Aragon Region during the Decennium 1914-1924.]—8vo, *Cons. Prov. Fomento de Zaragoza,* 134 pp., 40 figs. Saragossa, 1925.

This review of the occurrence and control of *Dociostaurus* (*Stauronotus*) *maroccanus* in Aragon is compiled from papers published from 1914 to 1924, many of which have been noticed.

HOWARD (C. W.) & BUSWELL (K. P.). **A Survey of the Silk Industry of South China.**—*Ling Nan Agric. Coll., Canton Christian Coll., Dept. Seric.*, Agric. Bull. 12, 208 pp., 1 map, 4 pls. Canton, January 1925.

In this review of the history of the silk industry of South China, information is given regarding the culture of the mulberry, the silkworms of South China, which differ from those of Central China in many important details, the preparation and marketing of the silk, and recommendations for the improvement of sericulture.

The pests of mulberry trees are also dealt with. The most important is *Arctornis chrysorrhoea* (*Porthesia similis*), which occurs as far north as Japan. This Lymantriid is found in small numbers throughout the growing season, but is more abundant in July and August, and individual caterpillars may be observed feeding as late as November. In 1921 and 1924 there were severe outbreaks of this moth. Remedial measures are difficult, partly owing to the effects of the poisonous hairs of the caterpillar. The next important pest is the Lamiid, *Apriona plicicollis*, which appears in June and feeds on the bark of the younger twigs. Each female may deposit 100 or more eggs, which are inserted in slits in the interior of the stem. They hatch in about two weeks, and the larvae work their way into the crown and larger roots, eventually causing the plant to break off and die. Pupation occurs in the burrows in the root or crown, and the adult beetles emerge early in the following summer. All plants that are found infested at the time of cutting the stems in December should be pulled up and burnt, and the beetles should be collected when they appear in the summer before oviposition. A large cricket, *Brachytrypes* sp., causes considerable damage where plants are located on sandy soil. Burrows are made in the soil and in the early spring the young shoots are cut off as they grow from the crowns and dragged into the burrows and eaten. The crickets can be destroyed by poison baits of sweet potato and arsenic inserted in the burrows. Leaf-eating caterpillars, which seldom do widespread damage, include *Hemerophila subplagiata*, *Boarmia* sp., *Spodoptera mauritia*, *Homona menciana*, the larva of which eats the opening leaf buds, and the leaf-roller, *Margaronia* (*Glyphodes*) *pyloalis*.

OKAMOTO (H.) & MURAMATSU (S.). **Studies on the Pear-stem Girdler, *Janus piri*, n. sp.**—*Bull. Agric. Expt. Sta., Govt.-Gen. Chosen*, ii, no. 1, pp. 9–16, 1 pl. Suigen, Korea, March 1925.

A sawfly, *Janus piri*, sp. n., is described from pear-trees in Korea, to which it seems to be restricted. The eggs are generally laid during late April or early May in the pith of the young shoots, usually on the south side of the tree, and immediately after depositing an egg, the female moves up the twig an inch or more and girdles the stalk, interrupting the flow of sap. One female may deposit from 16 to 32 eggs over a period of several days. Hatching occurs after 7 or 8 days, the larva boring immediately into the pith and tunnelling about below the point girdled. About November the larva becomes mature and bores out a pupation chamber in the woody part of the old twig, constructing a cocoon in which it passes the winter. Pupation occurs during late April, the adults emerging after 8 or 9 days. The girdling of the twigs causes immediate wilting and death of the tips,

and infestation is increasing until it is becoming a serious menace to the pear-growing industry of Korea. European pears are attacked to a greater extent than Japanese varieties. In the early spring, before the buds begin to open, the injured twigs, which are recognisable by a swollen condition at the base, should be cut out and burned, thus destroying the hibernating larvae and any pupae present. The withered shoots should be pruned off during late April or early May in order to destroy the eggs and young larvae. At this time the adults may also be collected.

RAMAKRISHNA AYYAR (T. V.). **List of the important Insects injurious to Cultivated Crops in South India.**—*Madras Dept. Agric.*, Bull. 86, 45 pp. Madras, 1923. [Received 15th June 1925.]

This list is issued as a companion to a previous bulletin [*R.A.E.*, A, x, 153], and the insects are tabulated according to the crops they attack. Unimportant plants and insects of minor importance have been omitted.

The Pest Act and Cotton; The Army Worm of Paddy; and Tobacco Aphis.—*Madras Dept. Agric.*, Leaflets nos. 32, 38 & 39, 4, 4 (1 fig.), 2 pp. Madras, 1925 (no. 32) & 1924.

The chief pests of cotton in the Madras Presidency are the stem weevil [*Pempheres affinis*], the spotted boll-worm [*Earias insulana*] and the pink boll-worm [*Platyedra gossypiella*]. The importance of the Pest Act of 1919 regulating the sowing of cotton is pointed out.

A short account is given of the life-history of *Spodoptera mauritia* (army worm of paddy) [*cf. R.A.E.*, A, x, 153] and its control, and of *Myzus persicae* (tobacco aphis). Instructions are given for the preparation and application of tobacco-soap solution for the control of Aphids.

PALM (B. T.). **Verslag van het Deli Proefstation over 1 Juli 1923-31 December 1924.** [Report of the Deli Experiment Station from 1st July 1923 to 31st December 1924.]—*Meded. Deli Proefst.*, 2nd Ser., no. 40, 34 pp. Medan, Sumatra, 1925.

Much of the work done during the year was concerned with tests of spraying tobacco in the field [*R.A.E.*, A, xii, 147, 270, 463; xiii, 223, 290]. *Prodenia* [*litura*] and *Phytometra* (*Plusia*) were less common, but, on the other hand, field tobacco was injured by an Aphid, *Myzus persicae*, and a Capsid bug, *Dicyphus* sp. Elaterid larvae were also found in the stalks of field tobacco. In May 1924 local injury was caused by a locust, *Catantops humilis*, and, in seedbeds, by a cricket, *Acheta* sp.

VAN HALL (C. J. J.). **Ziekten en Plagen der Cultuurgewassen in Nederlandsch-Indië in 1924.** [Diseases and Pests of Cultivated Plants in the Dutch East Indies in 1924.]—*Meded. Inst. Plantenziekten*, no. 67, 53 pp. Buitenzorg, 1925.

Potato pests included *Agrotis ypsilon*, *Phthorimaea operculella*, and a bug, *Nezara viridula*. *Cylas formicarius* (*turcipennis*) did comparatively little harm.

In forests primary injury to *Schleichera trijuga* by *Xyleborus fornicatus* and to seedlings of *Eusideroxylon zwageri* by *Xyleborus* sp. was noticed.

The infestation of cacao by *Acrocercops cramerella* was not serious in Central Java. Leaf-cutting beetles such as the Halticid, *Phytorus dilatatus*, and a Melolonthid, *Adoretus compressus*, were very injurious in many plantations.

Pests of green manure and shade plants included the caterpillars of *Catochrysops cnejus* in the pods of *Crotalaria* spp., resulting in a loss of seed; *Araecerus* sp., causing the loss of the seed crop of *Tephrosia candida*; and *Agromyza sojae*, which killed seedlings of *Vigna oligosperma*.

Kapok [*Eriodendron anfractuosum*] was injured by the borers, *Alcides leeuweni* and *Mudaria variabilis*. Cotton was infested sporadically by *Earias fabia*. Kédelé [*Glycine hispida*] was attacked by *Agromyza sojae*, and the pod-borer, *Etiella zinckenella*. Cinchona was attacked by *Helopeltis antonii*, *Attacus atlas*, *A. ricini*, *Metanastria hyrtaca*, *Phassus damor*, *Brevipalpus obovatus* and *Tetranychus bimaculatus*, and other mites.

Coconut pests were *Oryctes rhinoceros*, *Rhynchophorus ferrugineus* and *Brontispa* sp., and the caterpillars of *Parasa lepida* and *Brachartona catoxantha*. Enormous damage was done in the Talaud islands by the Tettigoniid, *Sexava coriacea* [*R.A.E.*, A, xiii, 74], which attacked the foliage of other palms also.

Coffee pests included *Stephanoderes hampei*, *Xyleborus coffeae*, *Coccus* (*Lecanium*) *viridis*, *Pseudococcus crotonis*, *P. virgatus*, *Oecophylla smaragdina*, and the caterpillars of *Hyposidra talaca*. Oil palms were attacked by Psychid caterpillars and *Oryctes rhinoceros*. The fruits of pepper (*Piper cubeba*) were more than usually injured by a weevil, *Lepidobaris* sp. Considerable injury was done to bananas by the banana moth, *Nacoleia* (*Notarcha*) *octosema*, about 40 per cent. of the fruits being infested in one instance.

Rice pests were *Cirphis* (*Leucania*) *unipuncta*, and *Valanga* (*Cyrtacanthacris*) *nigricornis*.

Sugar-cane was attacked by *Oregma lanigera*, *Tetranychus exsiccator*, *V. nigricornis*, and the caterpillars of *Thosea* sp. and *Dreata* sp.

Prodenia litura, *Phytometra signata*, *Myzus persicae*, and *Catantops humilis* were among the tobacco pests noticed. Wheat was attacked by *C. unipuncta*.

Tea on the East Coast of Sumatra suffered severe attacks from the caterpillars of *Stauropus* and *Thosea*. *Helopeltis* was practically absent there, *Phytorus dilatatus* being the principal pest of tea in the region.

Fruit-tree pests were a mining caterpillar, *Phyllocnistis citrella*, and the coffee cicada, *Lawana candida*.

SIMMONDS (H. W.). **Reports of the Government Entomologist for the Years 1921 and 1922.**—*Fiji Dept. Agric. Ann. Repts. 1921 & 1922*, pp. 6–8 & 3–5. Suva, December 1922 & 1923. [Received 12th June 1925.]

Most of this information has already been noticed from various sources, including a subsequent report [*R.A.E.*, A, xiii, 174]. *Pinnaspis buxi* is recorded from coconuts, though not causing serious damage. *Aspidiotiphagus citrinus* introduced against *Aspidiotus destructor* has

also been found attacking *A. cocotis*. Both scales were found on trees of the genus *Barringtonia*. *Drosophila melanogaster* (*ampelophila*) attacks all over-ripe fruits. Large numbers of this fly, together with two Hymenopterous parasites, were obtained from guavas.

CARMENT (A. G.). **Report on Mycological Work.**—*Fiji Dept. Agric. Ann. Rept. 1921*, p. 8. Suva, December 1922.

On examining banana plants infected with " Sigatoka Disease " and " Bunchy Top," the only uniform conditions found were the presence of *Cosmopolites sordidus*, and of a Nematode, and rotting of the outer tissue layers of the roots. In the course of experiments with fungous diseases of *Levuana iridescens* [*R.A.E.*, A, x, 39], *Pediculoides ventricosus* was found living inside the cocoons and feeding on the pupae.

The Banana Scab Moth.—*Agric. Circ. Dept. Agric. Fiji*, v, no. 2, pp. 75–76. Suva, 1925.

The banana scab moth is one of the most serious pests in Fiji, where it is apparently spreading. The only means of control is to dust the banana bunch, when just opening, with 1 part of pyrethrum and 3 parts of either sifted ashes or slaked lime. Enquiries are being made concerning the Hymenopterous parasite, *Tumidicoxa regina-dentata*, Gir., occurring in Queensland. Both in Queensland and Java characteristic injury has been traced to the larvae of the Pyralid, *Nacoleia octosema*. Life-history notes and experiments with regard to the control of this moth are quoted [*R.A.E.*, A, v, 278].

TOTHILL (J. D.). *Levuana iridescens.*—*Agric. Circ. Dept. Agric. Fiji*, v, no. 2, pp. 83–85. Suva, 1925.

The various means by which *Levuana iridescens* may be carried from one to another of the Fijian islands are discussed, and the importance of efficient inspection work in this connection is pointed out.

SIMMONDS (H. W.). **A Cut Worm Pest** (*Prodenia litura* **F.**).—*Agric. Circ. Dept. Agric. Fiji*, v, pp. 86–87. Suva, 1925.

The eggs of *Prodenia litura*, F., are laid on bananas, roses, coconuts, *Canna* and various other plants. Provided the plant on which the larvae emerge is sufficiently succulent, they may feed for a short time on the lower surface of the leaves. They then lower themselves to the ground, where they feed on young seedlings of a great variety of plants. Pupation occurs in the ground and lasts about 10 days. In spite of the numerous natural enemies, including Chalcids and the ant, *Pheidole megacephala*, these cutworms are one of the most destructive pests of gardens and sometimes of bananas. The egg-masses should be collected.

SIMMONDS (H. W.). **Kumala or Sweet Potato Weevil** (*Cylas formicarius*).—*Agric. Circ. Dept. Agric. Fiji*, v, no. 2, p. 87. Suva, 1925.

In a recent shipment of sweet potatoes to New Zealand 100 sacks were condemned owing to the presence of *Cylas formicarius*. The importance of using uninfested slips on uninfested land is pointed out, and a method of obtaining slips free from the weevil is described.

Banana Beetle Borer (*Cosmopolites sordidus*).—*Agric. Circ. Dept. Agric. Fiji*, v, no. 2, p. 88. Suva, 1925.

Cosmopolites sordidus has now invaded many of Fijian islands, and although not altogether responsible for the deterioration of the banana crop in old plantations, is at least accessory to it. As the beetle does not fly, it is possible to check or stamp it out from carefully cultivated plantations. Under Notice in the Royal Gazette of the 16th January 1925, the area brought under the regulations concerning this pest has been extended.

Miller (D.). **The Pear-midge. Further Observations and Control with Calcium Cyanide.**—*N.Z. Jl. Agric.*, xxx, no. 4, pp. 220–224, 1 map. Wellington, 20th April 1925.

The distribution of *Perrisia pyri* in New Zealand since its original introduction [*R.A.E.*, A, ix, 594] is reviewed. Experiments with calcium cyanide for the control of the larvae that have entered the ground to hibernate and pupate are described. Granular calcium cyanide was spread on the ground, and worked, not turned in, with a spade. The results, as gauged by the emergence of midges in tents pitched over the treated area, show that a dose of 1½ lb. to 200 sq. ft. is the weakest that will produce complete control. It is intended to carry out the work on a larger scale, treating whole orchards under commercial conditions. Though *P. pyri* was controlled by the stronger doses, these had no effect on other underground insects, and a general emergence of *Metampsalta cingulata*, Ichneumonids and Muscids was noticed in all tents.

Makgill (R. H.). **The Pear-midge Pest. Spraying Experiments at Henderson.**—*N.Z. Jl. Agric.*, xxx, no. 4, pp. 224–228. Wellington, 20th April 1925.

It having been suggested to the author that the nicotine-paraffin insecticide spray recommended against the woolly aphis [*Eriosoma lanigerum*, Hausm.] [*R.A.E.*, A, viii, 349] might prove useful against the pear-midge [*Perrisia pyri*, Bch.] by preventing oviposition, tests with it were made in New Zealand in 1922 and 1924. On both occasions a 2 per cent. miscible oil spray and 40 per cent. nicotine sulphate were used in place of original formula. The modified mixture acted well against *E. lanigerum*, in which connection its use was only discontinued when the introduction of *Aphelinus mali*, Hald., made it unnecessary. When carefully prepared no scorching was noticed. The addition of nicotine sulphate to the oil emulsion before instead of after dilution threw a certain amount of the oil out of suspension, resulting in scorching the leaves. On some trees a mixture of 6 lb. molasses in 100 gals. water containing 1 : 1,000 nicotine sulphate was used. The results suggest that by the use of nicotine sulphate *P. pyri* may be kept kept in check during October and the first half of November sufficiently to permit the early twig growth to become established and to enable the trees to develop a fair covering of leaves. As these measures must tend to discourage bees, spraying should be suspended while the blossom is fully open. Though, during October, spraying at intervals of three weeks appeared to be sufficient, during November weekly spraying was apparently inadequate. Further tests are to be made next spring. In regard to the composition of the spray, the nicotine salt is the active agent, but the most suitable

medium for applying it has not been determined. On the whole, the miscible oil appeared to give the most lasting results. Molasses proved satisfactory and is easily dissolved. Possibly a simple soap solution may be found to be equal to the agents tested.

COTTRELL-DORMER (W.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxiii, no. 5, pp. 389–393. Brisbane, 1st May 1925.

In the Mossman district [*Lepidiota*] *frenchi* attacked young plant or ratoon canes in some fields causing stunting; *Aphis sacchari* (sugar-cane aphis) and the accompanying sooty fungus were present in certain small areas. In another district it is expected that the greyback beetle [*Lepidoderma albohirtum*] will be more in evidence than in the previous year. It is suggested that the growers should be shown by demonstration the value of fumigation against cane grubs. *L. frenchi* has done minor damage and *L. caudata* and [*Dasygnathus*] *australis* were also present.

JARVIS (E.). **Entomological Hints to Canegrowers.**—*Queensland Agric. Jl.*, xxiii, no. 5, pp. 393–394, 1 fig. Brisbane, 1st May 1925.

Many grubs are killed during March to June by the fungus, *Metarrhizium anisopliae*, and become dry and mummified. In this state they should be broken up into small pieces and mixed with about 100 times their bulk of moist, finely-sifted soil, rich in organic matter. This should then be sprinkled or sown as thinly as possible in the furrows when planting sugar-cane in areas likely to be grub-infested. During ploughing operations the grubs should be collected when plentiful. The value of dried cane grubs as a fertiliser is about £11 per ton. Caterpillars of *Phragmatiphila truncata*, Wlk. (large moth-borer) are troublesome in some parts of Queensland, destroying shoots of young ratoon and plant cane. Diseased shoots showing dead hearts should be cut out about a couple of inches below ground level and either crushed or burned to kill the caterpillars and pupae. This should be done at the beginning of the season, and in cases of severe infestation parasites should be allowed to escape.

PERKINS (F. A.) & HARDY (G. H.). **The Hibernation and Parasitism of a Fruit Fly in the Stanthorpe District.**—*Queensland Agric. Jl.*, xxiii, no. 5, pp. 431–437, 2 pls. Brisbane, 1st May 1925.

Maggots of a fruit-fly, *Dacus ferrugineus* (*tryoni*), or a variety of it, have been found in the Stanthorpe district of Queensland infesting the wild fruit tree, *Noteloea longifolia* var. *velutina*, which bears small purple-coloured fruit. The infestation was discovered in June, and by the end of July there was no fruit left on the trees, but 150 puparia were obtained from soil beneath them. These were found to be heavily infested by parastites, of which all those successfully reared proved to be the Braconid, *Diachasma tryoni*. It is unlikely, therefore, that more than a small percentage of the flies would survive the winter.

JARVIS (E.). **Notes on Queensland Cane Insects and their Control.**—*Queensland Bur. Sugar Expt. Sta.*, Div. Ent., Bull. 18, 64 pp., 11 pls., numerous figs. Brisbane, 1925.

This continuation of a previous bulletin [*R.A.E.*, A, xii, 374] embodies information that has been noticed from monthly reports.

ALLEN (W. J.) & LE GAY BRERETON (W.). **Orchard Notes.**—*Agric. Gaz. N.S.W.*, xxxvi, no. 5, pp. 378–379. Sydney, 1st May 1925.

Before growers of deciduous fruits close down their packing sheds for the season, larvae or pupae of the codling moth [*Cydia pomonella*, L.] or of any other fruit pests should be searched for and destroyed. All cases, etc., that have held infested fruit should be dipped in boiling water for 3 minutes. If the packing benches and other woodwork cannot be taken down they should be gone over carefully and any open joints or cracks probed with wire, and finally the shed should be made moth-proof for the following spring. Shelter bands should be left on the trees until late in the winter.

BROOKE (W. L.). **The Nicotine Content of Philippine Tobacco Stems.**—*Philipp. Jl. Sci.*, xxvi, no. 4, pp. 497–499. Manila, April 1925.

The nicotine content of the tobacco stems obtained from various Manila cigar factories is given, and estimates show that nicotine recovery at present prices would probably be a commercial possibility. *Nicotiana rustica* would be the most profitable for the manufacture of nicotine sulphate, as it has a nicotine content of from 6 to 8 per cent.

BONDAR (G.). **O Cacao. Parte II. Molestias e inimigos do Cacaoeiro no estado da Bahia-Brazil.** [Cacao. Part II. The Diseases and Enemies of the Cacao Tree in the State of Bahia, Brazil.]—*Secretaria Agric., Ind. Comm., Viação e Obras Publicas, Bahia*, 126 pp., 74 figs. Bahia, 1925.

Practically the whole of this monograph deals with insect pests of field and stored cacao. Most of the information has already been noticed from earlier papers by the same author [*R.A.E.*, A, x, 614; xi, 240; xii, 28, 60, 182, 484, 527].

New species described here are the Coccids, *Ceroplastodes melzeri*, *C. bahiensis*, *C. theobromae* and *C. costa-limae*, and a Cassid beetle, *Porphyraspis reis-magalhaesi*. Both the larva and adult of the last-named feed on the foliage, but their economic importance is negligible.

BONDAR (G.). **Bicho das goiabas,** *Conotrachelus psidii*, Marshall. [The Guava Grub, *C. psidii*.]—*Bol. Lab. Path. veg. Bahia*, no. 1, pp. 17–19, 1 fig. Bahia, July 1924. [Received 25th June 1925.]

The weevil, *Conotrachelus psidii*, Mshll., is a pest of guavas in Bahia, the adults occurring in the orchards in January, February and March, and ovipositing in fruits that are about one-third grown. The larva feeds within the fruit, chiefly on the seeds. The infested fruit falls, and the mature larva begins to pupate in the ground at a depth of 2-6 inches in June and July. The adult appears in October-November, but remains underground until November-December. When the rains soften the soil, the weevils emerge from the ground. Ploughing destroys many larvae and pupae, and fowls are useful auxiliaries. The best measure, however, consists in picking the fruits in April-June before they fall. All infested fruits must be placed in hot water to kill the larvae.

BONDAR (G.). [**Entomologist's Reports.**]—*Bol. Lab. Path. veg. Bahia*, no. 2, pp. 3–26, 4 figs. Bahia, January 1925.

Heliothrips rubrocinctus is a serious pest of cacao in Bahia. Lack of labour precludes spraying, but infestation may be reduced by thinning the plantations and severely pruning the trees.

Coccids and Membracids are also common pests of cacao; they are protected by the ants, *Azteca chartifex* and *Dolichoderus attelaboides*.

BONDAR (G.). **Combatendo a praga dos cafeeiros.** [Combating a Coffee Pest.]—*Bol. Lab. Path. veg. Bahia*, no. 2, pp. 43–44. Bahia, January 1925.

The Aleurodid, *Aleurothrixus floccosus*, Mask., is a pest of coffee in Bahia. In an attempt to reduce its numbers, orange foliage infested with *A. floccosus* parasitised by a fungus, *Aschersonia aleurodis*, was introduced, and in spite of the apparently unfavourable dry atmosphere a successful result was obtained, two coffee plantations being freed from the pest.

BONDAR (G.). **Formiga "raspa," praga dos pastos.** [*Acromyrmex landolti*, For., a Pest of Pastures.]—*Bol. Lab. Path. veg. Bahia*, no. 2, pp. 45–47. Bahia, January 1925.

In southern Bahia derelict coffee plantations have been transformed into pastures, but of recent years these have been seriously damaged by an ant, *Acromyrmex landolti*, For. It is suggested that the ground should be ploughed up to destroy the nests and then be planted with a crop such as tobacco.

DE AZEVEDO (A.). **A lagarta "verde" do fumo.** [The Green Caterpillar of Tobacco.]—*A Lavoura*, xxix, no. 4, pp. 148–149. Rio de Janeiro, April 1925.

Larvae of the Sphingid, *Protoparce paphus*, Cram., are common in Brazil on tobacco and other Solanaceous plants. Pupation takes place underground, at a depth of about 4 inches. The total life-cycle occupies about 40 days. Collection of the caterpillars, spraying with an arsenical and the destruction of the pupae by ploughing are the measures advocated. Spray formulae suggested are Paris green 1 lb., slaked lime 5 lb., water 100 gals.; and lead arsenate, 8 lb., wheat flour 10 lb., and water 100 gals. The latter is less likely to scorch the foliage. Natural enemies, such as the Braconid, *Apanteles congregatus*, Say, and the Tachinid, *Belvosia bifasciata*, F., are of great value in keeping down the numbers of this moth.

RONNA (E.). **Molestias parasitarias dos Chrysanthemos. Um novo parasito.** [Parasitic Affections of Chrysanthemums. A new Pest.]—*Egatea*, viii, no. 1, pp. 7–11, 1 fig. Porto Alegre, January-February 1923. [Received 26th June 1925.]

The worst pest of chrysanthemums in Rio Grande do Sul, Brazil, is an Agromyzid fly, *Agromyza guaranitica*, Brèthes, which oviposits on the upper surface of the leaves, in the tissues of which the larvae

feed for 7–10 days. They pupate in the leaf, and the adult emerges after a period of 15-20 days. The best remedy appears to be the collection of all infested leaves.

WILLE (J.). **O *Aulacaspis pentagona*, uma praga do pecegueiro no Rio Grande do Sul.** [*Diaspis pentagona*, a Pest of the Peach in Rio Grande do Sul.]—*Egatea*, viii, no. 6, pp. 474–480, 1 pl., 4 figs. Porto Alegre, November-December 1923. [Received 26th June 1925.]

This article briefly describes the biology and control of the scale, *Diaspis* (*Aulacaspis*) *pentagona*, Targ., which is a pest of peach trees in Rio Grande do Sul.

RONNA (E.). **Apontamentos de Microfauna Rio-Grandense. III Serie —Rhynchotos. V Serie — Dipteros. VI Serie — Orthopteros.** [Notes on the Microfauna of Rio Grande. III. Rhynchota. V. Diptera. VI. Orthoptera.]—*Egatea*, ix, nos. 2–3, pp. 137–145, 267–272, 3 figs. Porto Alegre, March-April & May-June 1924. [Received 26th June 1925.]

The Rhynchota mentioned in these brief notes include *Diaspis* (*Aulacaspis*) *pentagona*, Targ., infesting peach and other fruit trees; *Pemphigus canadensis*, Del Guerc., injuring the leaves of *Populus canadensis*; *Icerya purchasi*, Mask., on orange, rose and chrysanthemum; *Margarodes vitium*, Giard (*vitis*, Philippi), almost certainly imported from Argentina and now a pest of the grape-vine in Brazil; and *M. brasiliensis*, Hempel, which has recently spread rapidly on various plants of economic importance.

The Diptera include *Agromyza guaranitica*, Brèthes, infesting chrysanthemums; the Syrphid, *Baccha clavata*, F., preying on *Aphis maidis*, Pass.; *Lasiopa atrata*, F., and *Lonchaea chalybea*, Wied., infesting fruits; *Sarcophaga blandita*, Brèthes, parasitising a Mantid; *S. lubera*, Brèthes, and *S. clotho*, Brèthes, parasitising *Schistocerca paranensis*, Burm.; *Euxesta eluta*, Lw., infesting oranges; *Anastrepha fraterculus*, Wied., the commonest fruit-fly in South America; and *Lonchaea aenea*, Wied., very common in fruits in Brazil.

The Orthoptera mentioned are *Schistocerca paranensis* and *Occanthus pellucens*, Scop.

WILLE (J.). **O *Novius cardinalis*.**—*Egatea*, ix, no. 2, p. 146. Porto Alegre, March-April 1924. [Received 26th June 1925.]

Of recent years the Coccid, *Icerya purchasi*, Mask., has attacked cultivated plants in Rio Grande, but steps are being taken to distribute the Coccinellid, *Novius cardinalis*, Muls., to control it.

DE TOLEDO RODOVALHO (B.). **Defendendo o café. O repasse.** [The Defence of Coffee. Cleaning-up of Coffee Plantations.]—*Rev. Soc. rur. brasil.*, vi, no. 59, pp. 188–192, 4 figs. S. Paulo, May 1925.

The subject matter of this article on measures against *Stephanoderes hampei* is substantially the same as in one already noticed from another journal [*R.A.E.*, A, xiii, 345].

BONDAR (G.). **Uma nova praga do fumo e de outras Solanaceas cultivadas.** [A new Pest of Tobacco and other cultivated, Solanaceae.]—*Correio-agric.*, iii, no. 5, pp. 115–118, 2 figs. Bahia, May 1925.

The weevil, *Collabismodes tabaci*, Mshll., is a pest of tobacco, tomato and pimento in Bahia. The development of the larvae is slow, requiring about 3 months. Infestation is facilitated when the eggs are laid after pruning, as the larvae enter through the cut surfaces. On attaining maturity the larva forms a case inside the mine and pupates. The adults, which emerge about ten days later, are not seen by day, oviposition and feeding taking place at night. The adults feed on the bark of the stems, and the larvae on the medulla. The most practical measure is the collection and burning of all cuttings, which, owing to the slow development of this species, contain many larvae, pupae and adults. Spraying with Paris green may be tried for tomato and pimento plants ; though this treatment does not reach the larvae in their mines, it drives away the adults. All dead or dying plants should be burned or buried 4–8 inches deep.

BARROW (E. H.). **White Grubs, *Lachnosterna* sp., and Larvae of the Weevil Root-borer, *Diaprepes spengleri*, L., attacking Sugar-cane in the Guanica District of Porto Rico, and Methods practised for controlling them.**— *Jl. Dept. Agric. Porto Rico*, viii, no. 2, pp. 22–26. Rio Piedras, P.R., April 1924. [Received 24th June 1925.]

The chief method of checking the numbers of *Lachnosterna* (white grubs) in Porto Rico is the collection of larvae and beetles. The cost and results obtained by this method during the last few years are discussed. Although none of the wasps of the genus *Tiphia* introduced into the Island several years ago for the control of the grubs [*R.A.E.*, A, xi, 60] had been previously recovered, some have now been found, and are apparently a new species. As yet, however, no grubs have been found parasitised by them. *Diaprepes spengleri*, L. (weevil root-borer of sugar), is perhaps an even more serious pest, as the damage done by individual borers is greater and collection is more difficult and expensive. In one field where very good results were obtained, as soon as the canes were harvested the trash on a portion of the field was burned off and the cane stools ploughed out very carefully. The stools were cut to pieces and the mould shaken off ; they were then collected and burned gradually among burning trash, as the only way to kill the larvae is by having sufficient heat to penetrate the cane as far as they have tunnelled. This should be done as soon as possible after the canes have been harvested, otherwise the borers will have entered the soil, where it is difficult to find them. The field was then ploughed and kept free from weeds by ploughing or harrowing, so that any beetles emerging would have no place in which to hide. If bushes of pigeon-peas (*Cajanus indicus*) are planted round the fields, the beetles will assemble on them and are easily collected. In Barbados the beetles have also been observed to congregate on cassava (*Manihot utilissima*). The eggs are laid on leaves of sugar-cane and other plants, a piece of leaf being stuck down to cover them : these egg-masses should be collected and destroyed, but are rather difficult to find. Paradichlorobenzene at the rate of 200 and 400 lb. per acre was tried, and although no improvement was noticed, further experiments will be carried on with this substance.

Insect Pests and Plant Diseases.—*Rept. Agric. Dept. Grenada 1924*, p. 3. Trinidad, 1925.

Platyedra (*Pectinophora*) *gossypiella* occurred on cotton in Grenada during the year, and legislation has been enacted for its control. Other insect pests recorded are *Tomaspis saccharina*, Dist., in neglected and old, ratooning sugar-cane fields; *Heliothrips rubrocinctus*, Giard (cacao thrips); *Aphelenchus coccophilus*, Cobb, causing red-ring of coconuts; and *Araecerus* (*Araeocerus*) *fasciculatus*, DeG. (mace weevil). None of these, however, occurred in great abundance.

Bovell (J. R.) & d'Albuquerque (J. P.). **Report on the Sugar-Cane Experiments for the Season between 1922-1924.**—*Barbados Dept. Agric.*, 63 pp. Barbados, 1925.

Details are given of manurial and other experiments as affecting the yield of sugar-cane, but owing to the abundance of *Diaprepes abbreviatus*, L. (root borer) and *Lachnosterna* (*Phytalus*) *smithi*, Arrow (brown hardback), no definite conclusions can be drawn. Though a greater number of these beetles has been collected during the year than previously on the same field, the slightly better rainfall appears to have mitigated the effects of the injury caused by them.

Hoffmann (C. C.), Dampf (A.) & Varela (G.). **Informe de la comisión cientifica exploradora de la plaga de la langosta en el estado de Veracruz.** [Report of the Scientific Committee for the Investigation of the Locust Pest in the State of Veracruz.]—*Monogr. Inst. Hig., Sec. Paras.*, no. 3, 140 pp., 46 pls. Mexico, 1925.

This is the report of a committee that was formed in consequence of complaints that the water supplies in the State of Vera Cruz, Mexico, were contaminated by the dead bodies of locusts that had invaded the country.

Schistocerca paranensis, Burm., was the species concerned, and it reaches its northern limit of distribution in Mexico. Its biology and morphology are discussed.

As regards natural enemies no mites were found attacking the eggs; the few individuals taken from adult locusts belonged to the genus *Achorophus*. The most important egg parasite in Mexico is a Meloid beetle, and in one instance an examination made on 20th September showed that 19 per cent. of the egg-cases were infested by its larvae. Larvae of Anthomyiid and Phorid flies were also met with, but their rôle is not clear. Large numbers of free Nematodes were found in the egg-cases, including a new species of *Rhabditis*. *Coccobacillus acridiorum* was found in all specimens of *S. paranensis* that were examined, and even in the eggs, so that its occurrence in locusts is probably a case of symbiosis. A fungus of the genus *Botrytis* also occurs on the locusts.

Masses of the dead bodies of these insects may become a suitable medium for the culture of pathogenic organisms, including *Bacillus coli*, and may thus become sources of contamination of water supplies.

Hopping (R.). *Juniperus scopulorum* **as a Host.**—*Canadian Ent.*, lvii, no. 5, pp. 105–106. Orillia, Ont., May 1925.

Callidium californicum, Casey, *Phlocosinus scopulorum*, Sw., and *P. hoppingi*, Sw., are recorded from British Columbia as attacking *Juniperus scopulorum*. This is the first record of *P. hoppingi* north

of California. As 704 injurious beetles were obtained from three small pieces of this tree (each 3-4 inches in diameter and 3 ft. long), the importance of clearing and destroying slash is obvious.

Muesebeck (C. F. W.). U.S. Bur. Ent. **A Revision of the Parasitic Wasps of the Genus *Microbracon* occurring in America North of Mexico.**—*Proc. U.S. Nat. Mus.*, lxvii, art. 8, no. 2580, 85 pp., 2 pls. Washington, 1925.

In this revision the author treats *Habrobracon* as a synonym of *Microbracon*. The species dealt with include *Microbracon sphenophori*, sp. n., a parasite of *Sphenophorus callosus*, Oliv., in Missouri; *M. cushmani*, n. n., for *Habrobracon variabilis*, Cushm. (nec Provancher); *M. platynotae*, Cushm., a parasite of *Platynota* sp., and *Platyedra* (*Pectinophora*) *gossypiella*, Saund., in California and Mexico; *M. pyralidiphagus*, sp. n., a parasite of *Chilo* and *Diatraea* in Louisiana; *M. tenuiceps*, sp. n., a parasite of *Hypera* (*Phytonomus*) *nigrirostris*, F., in Virginia; *M. pini*, sp. n., a parasite of *Pissodes strobi*, Peck, in Massachusetts; *M. sesiae*, sp. n., bred from *Aegeria tipuliformis*, L., in Connecticut; *M. thurberiphagae*, sp. n., a parasite of *Thurberiphaga diffusa*, Barnes, in Arizona; and *M. cerambycidiphagus*, sp. n., bred from *Oberea* sp. in *Crataegus* and *Prunus* in Pennsylvania.

A list is given of Say's species of the genus *Bracon* with the names of the genera to which they seem to be referable.

Burgess (A. F.). **Federal Gypsy Moth Work in Massachusetts.**—*Ann. Rept. Commiss. Conserv. State Forester Mass. 1924*, Publ. Document no. 73, p. 19. [Boston, Mass., 1925.]

From the autumn of 1923 to the spring of 1924 the gipsy moth [*Porthetria dispar*, L.] was recorded in 90 localities in Massachusetts. Infestation appeared to be less heavy than in the previous year, though the percentage of parasitism was considerably less. Linseed oil and fish oil have proved to be effective as adhesives in lead arsenate sprays against this pest [*R.A.E.*, A, xiii, 333]. When they are used at the rate of 1 qt. to 100 gals. of lead arsenate solution, the spray will adhere even to the foliage of white oak and poplar, and is only slightly washed off by heavy rains.

The brown tail moth [*Nygmia phaeorrhoea*, Don.] is well under control, though in some localities webs were more abundant than in previous years. Parasitism of this species was also somewhat reduced.

Britton (W. E.). **Twenty-fourth Report of the State Entomologist of Connecticut, 1924.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 230–344, 20 pls., 15 figs. New Haven, Conn., March 1925.

Insects injuring fruit in 1924 were *Malacosoma americana*, Harr.; *Alsophila pometaria*, Harr., very abundant locally and particularly injurious to apple, elm, hickory and oak; *Hemerophila pariana*, Clk. (apple and thorn skeletoniser), which was apparently controlled by natural enemies; *Cydia* (*Laspeyresia*) *molesta*, Busck; *Paratetranychus pilosus*, C. & F., less abundant than in 1923; *Agrilus sinuatus*, Oliv. (sinuate pear borer); *Erannis tiliaria*, Harr.; *Lygidea mendax*, Reut. (false apple red bug); *Anuraphis roseus*, Baker (rosy apple aphis); *Aphis pomi*, DeG. (green apple aphis), which hatched in April, but had practically disappeared in the orchards under observation by 22nd May; *Eriosoma lanigerum*, Hausm. (woolly apple aphis); *Psylla pyricola*, Foerst (pear psylla); *Conotrachelus nenuphar*,

Hrbst. (plum curculio), which is still one of the important pests of apples, though fair control was obtained by thorough applications of lead arsenate at the pink, calyx and two weeks spray; *Myzus ribis*, L., present as usual on currant bushes; and *Janus integer*, Nort. (currant stem girdler).

Most of the common pests of vegetables were present in 1924, including the stalk borer, *Papaipema nitela*, Gn.; *Epitrix cucumeris*, Harr. (potato flea-beetle); *Crambus praefectellus*, Zinck. (silver-striped webworm); *Heliothis* (*Chloridea*) *obsoleta*, F. (corn ear worm); *Diabrotica longicornis*, Say (western corn rootworm); a Cassid beetle, *Deloyala clavata*, F., feeding on potato; *Pegomyia hyoscyami*, Panz. (spinach leaf-miner); *Phorbia* (*Hylemyia*) *brassicae*, Bch., *Pieris* (*Pontia*) *rapae*, L., and *Phytometra* (*Autographa*) *brassicae*, Riley, on cabbages; *Acidia fratria*, Lw. (parsnip leaf-miner), recorded for the first time in Connecticut in 1924; *Thrips tabaci*, Linde (onion thrips); *Crioceris asparagi*, L., and *C. duodecimpunctata*, L., on asparagus; *Aphis pseudobrassicae*, Davis (turnip aphis); *Illinoia pisi*, Kalt. (pea aphis); *Macrosiphum solanifolii*, Ashm. (potato aphis); and *Brevicoryne brassicae*, L. (cabbage aphis).

Shade trees and forest insects included *Malacosoma americana*, F.; *Alsophila pometaria*, Harr.; *Hyphantria cunea*, Dru.; *Galerucella luteola*, Mull. (elm leaf beetle); *Tortrix quercifoliana*, Fitch (oak leafroller); *Chermes strobilobius*, Kalt. (larch leaf aphis); *C. cooleyi* var. *coweni*, Gill., attacking Douglas fir; *Argyresthia thuiella*, Pack. (arbor-vitae leaf-miner); *Coleophora laricella*, Hb. (larch case-bearer); *Zeuzera pyrina*, L.; *Bucculatrix canadensisella*, Chmb. (birch leaf skeletoniser); a European saw-fly, *Fenusa pumila*, Klug, which has apparently become established and mines the terminal leaves of grey birch; *Rhyacionia* (*Evetria*) *buoliana*, Schiff. (European pine-shoot moth); *Agrilus anxius*, Gory (bronze birch borer); and *Dichomeris* (*Ypsolophus*) *marginellus*, F. (juniper webworm).

Emphytus cinctus, L., was found on imported nursery stock from England, France and Holland, and *Notolophus antiquus*, L., and Lepidopterous pupae on apple stocks from France.

Specimens of larvae, probably of the walnut bud moth, *Acrobasis caryae*, Grote, were found infesting a Japanese walnut tree. Sawfly larvae on small arbor-vitae nursery trees were identified as *Monoctenus juniperinus*, MacG. *Ericoccus azaleae*, Comst., was found on *Rhododendron*. A cockroach, *Pycnoscelus surinamensis*, L., was received from a greenhouse in June. The correct name for the sawfly on white pine is *Neodiprion pinetum*, Nort. (*Lophyrus abbotti*, Leach). A mealy bug on yew was first identified as *Pseudococcus kraunhiae*, Kuw., but may be an undescribed species. A European Nitidulid beetle, *Heterostomus pulicarius*, L., caused injury to strawberry plants and young fruit. Pine seedlings were girdled by *Hylobius pales*, Hbst. *Diabrotica longicornis*, Say (western corn root worm), apparently not previously recorded in Connecticut, occurred on marsh mallow. Larvae of a sawfly, *Abia americana*, Cress., defoliated honeysuckle.

Britton (W. E.) & Ashworth (J. T.). **Report of Gipsy Moth Work, Year ending June 30, 1924.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 254–276, 1 fig. New Haven, Conn., March 1925.

The situation with regard to the gipsy moth [*Porthetria dispar*, L.] in the various counties is reported on, and statistics of infestations

are given. During 1924 733,650 individuals of the Japanese egg parasite, *Schedius kuvanae*, How., were liberated in Connecticut, 243,000 of another egg parasite, *Anastatus bifasciatus*, Fonsc., and 3,000 of the larval parasite, *Apanteles melanoscelus*, Ratz. Much benefit has resulted from the combined attacks of the various parasites in the New England area, though the reduction in numbers of the gipsy moth should not be attributed solely to their action. The creosoting of egg clusters, spraying around infestations and low temperature are partly responsible for the decrease.

Britton (W. E.) & Zappe (M. P.). **The European Corn Borer in Connecticut.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 277–282. New Haven, Conn., March 1925.

As the result of scouting work during 1924, seven small infestations of the European corn borer, *Pyrausta nubilalis*, Hb., were found. Quarantine Order no. 5 [*R.A.E.*, A, xii, 422] is repealed by Quarantine Order no. 7, as Connecticut is protected against the importation of this pest from other States by the Federal Quarantine.

Zappe (M. P.) & Stoddard (E. M.). **Dusting versus Spraying. Season of 1924.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 286–292. New Haven, Conn., March 1925.

Experiments to determine the relative value of dusting and spraying were continued during 1924. Whereas the best grade of apples is produced by spraying, there is considerable value in dusting, especially in dry years. A spray of 3 lb. lead arsenate, 6 lb. dry lime-sulphur, 1 lb. casein spreader, ¾ U.S. pint nicotine sulphate and 100 U.S. gals. water; and dusts consisting of sulphur 90 per cent. and lead arsenate 10 per cent., metallic copper 6 per cent. and metallic arsenic 3 per cent., and metallic copper 3·74 per cent. and metallic arsenic 1·76 per cent. were applied. The addition of nicotine to the spray gave good control of leafhoppers, but one application of nicotine dust gave in most cases better control of Aphids than three of nicotine spray. Other insects were controlled about equally well by all the treatments.

Zappe (M. P.) & Stoddard (E. M.). **Summary of Five Years' Work on Spraying and Dusting.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 293–294. New Haven, Conn., March 1925.

A table is given showing the average results for all spraying and dusting on all varieties of apples for five years. From this it would appear that dusting is practically as good as spraying for the control of the red bug [*Lygidea mendax*], curculio [*Conotrachelus nenuphar*], codling moth [*Cydia pomonella*], and other chewing insects. Aphids have not been controlled by either treatment, and it is evident that these insects and *C. nenuphar* cause the greatest amount of injury to treated trees and are the most difficult to control.

Zappe (M. P.) & Garman (P.). **Tests of Insecticides for the Control of the Asiatic Beetle, *Anomala orientalis*, Waterhouse.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 294–299. New Haven, Conn., March 1925.

In tests of several insecticides for controlling *Anomala orientalis*, Waterh., in the larval stage in lawns, calcium cyanide dust was applied

at rates of 4 to 6 oz. per sq. yd. By the broadcast method of application numerous larvae were killed, but the grass was badly scorched, and as the operators suffered disagreeable effects, this material cannot be recommended for general use. It was ineffective when buried in holes in the ground. Sodium cyanide dissolved in water was also applied, but when of sufficiently high strength to effect control, the grass was badly scorched. Mercury bichloride or a 10 per cent. kerosene emulsion were of no value. The most promising insecticide and soil fumigant was carbon bisulphide emulsion. Plots 1 yard square were treated with $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ U.S. pint, the amount of emulsion being first diluted in about 3 U.S. gals. water, and then sprinkled on the lawn with a watering can, the ground being afterwards soaked with a hose. The grass was slightly injured by the stronger emulsions, but not noticeably so by the weakest one, and complete control was effected in all 3 tests. The same treatment was applied in late autumn when the soil temperature was only 67° F., and a 70 per cent. kill resulted. The gas from the carbon bisulphide is apparently not given off fast enough at low temperatures to kill a high percentage of larvae. The formula for a home-made carbon bisulphide emulsion is given [*R.A.E.*, A, xi, 414], and a fairly stable emulsion can be made by substituting either fish-oil soap or the ordinary naphtha laundry soap for the resin-fish oil soap mentioned, and is satisfactory for immediate use.

GARMAN (P.). **Studies of the Habits and Control of the Oriental Peach Moth in 1924.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 299–303. New Haven, Conn., March 1925.

The oriental peach moth, *Cydia* (*Laspeyresia*) *molesta*, Busck, was very abundant in Connecticut in 1924. All larvae spinning cocoons after 25th August hibernated before pupating. Larvae were abundant in fruit from 13th September till 2nd October. It is thought that there are at least 3 broods in Connecticut, but the adults did not reach their maximum abundance in 1924 until August, and the larvae were most abundant from 15th August until the end of September. Remedial measures must therefore be applied towards the latter part of the season. A general summary of the habits of the oriental peach moth has already been given [*R.A.E.*, A, vi, 369]. Young larvae soon after hatching may be killed with arsenicals [*R.A.E.*, A, ix, 30], but the older larvae are not easily destroyed. The larvae frequently spin on the ground or near it on the trunk, and clean cultivation, together with the use of paradichlorobenzene, winter-strength lime-sulphur and the like should be of assistance. The silken cocoon is waterproof, and it is not known how sprays of the sort mentioned affect larvae in them.

GARMAN (P.). **Effect of various Insecticides on the Eggs of the European Red Mite** (*P. pilosus* **C. & F.**).—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 304–305. New Haven, Conn., March 1925.

Numerous of experiments have recently been conducted regarding the efficacy of certain insecticides on the winter eggs of *Paratetranychus pilosus*, C. & F. Two proprietary miscible oils were compared, and experiments indicate that a dilution of 1–20 or 1–25 does not greatly reduce the toxicity of miscible oils of this type. Soluble sulphur compounds did not give as high a mortality in laboratory tests.

GARMAN (P.). **The Alcohol-Formalin Solution for Control of American Foul Brood.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 305–307. New Haven, Conn., March 1925.

Combs containing American foul brood may be successfully sterilised with a solution of 20 per cent. formalin in alcohol, by soaking the combs for 48 hours after extracting all honey. The methods of procedure are described. It is not, however, certain that the treatment is practical, owing to the cost. Work along this line is to be continued.

GARMAN (P.). **The Egg of the Blueberry Spittle-bug,** *Clastoptera proteus*, **Fitch.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 307–308. New Haven, Conn., March 1925.

The eggs of *Clastoptera proteus*, Fitch (blueberry spittle-bug), are similar to those of the alder bug, *C. obtusa*, Say, and are laid beneath the bark on the outer twigs. They are sometimes thrust directly into the plant parallel to the axis of the stem and sometimes diagonally.

FRIEND (R. B.). **Substances attractive to the Cabbage Maggot Fly.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 314–318. New Haven, Conn., March 1925.

In experiments to find some substance that would attract the adult females of the cabbage fly, *Phorbia* (*Hylemia*) *brassicae*, Bch., before oviposition, materials were tried containing extracts of the cabbage plant or pieces of the plant itself. In view of the results obtained elsewhere with a honey and yeast mixture in attracting the adults of *Hylemyia antiqua*, Meig. (*ceparum*, Meig.), this medium was extensively used in experiments. The method of obtaining an alcoholic extract of the cabbage plant is described. When this was distilled to about one-twentieth of its original volume, most of the odoriferous substance remained in the residue. About 5 gms. of honey, molasses or sugar was used in a bait with enough water to make 60 cc. About 20 cc. of residue was used, and when yeast was added a 5 mm. cube was found enough. If pieces of cabbage were used, 5 or 6 pieces of leaf about 2 cm. square were added. Residue, honey, yeast and water proved by far the most attractive, and cabbage-yeast-molasses-water came next. The addition of yeast in quantities sufficient to form a noticeable ferment was of distinct value. The residue-honey-yeast formula showed the greatest durability, and on a warm, bright day attracted more flies than on a cool or cloudy one. Estimates of the flies caught indicated that 68 per cent. of the females and 76 per cent. of the males were *Phorbia* (*Hylemyia*) *cilicrura*, Rond., and only 5 per cent. of the females and two per cent. of the males were *P. brassicae*. The other species represented were *H. antiqua*, *P.* (*H.*) *trichodactyla*, Rond., and *H. cinerella*, Fall.

Females predominated greatly over males, and the great majority of them had not finished ovipositing. In experiments elsewhere, allyl isothiocyanate and allyl alcohol have proved attractive to *P. cilicrura* and *H. antiqua*, and further trials will be made with these against *P. brassicae*.

FRIEND (R. B.) & WALDEN (B. H.). **Experiences in Dusting to kill Pea Aphid, Cabbage Aphid, and Onion Thrips.**—*Connecticut Agric. Expt. Sta.*, Bull. 265, pp. 319–320. New Haven, Conn., March 1925.

Experiments were carried on to determine whether nicotine dust (commercial brands containing 2·75 per cent. nicotine and 3 per cent.

nicotine) would kill *Brevicoryne brassicae*, L., *Illinoia pisi*, Kalt., and *Thrips tabaci*, Lind. In all cases a rotary hand duster was used. A 3 per cent. nicotine dust, applied at the rate of 50 lb. per acre between 7 a.m. and 1 p.m., almost entirely eliminated *B. brassicae*. Dusting for the control of this Aphid should be done before the leaves are curled, and the best time is the late afternoon of a warm, quiet day.

I. pisi was only locally abundant around New Haven in 1924. In a badly infested field of garden peas, a very heavy application of 2·75 per cent. nicotine dust at the rate of 140 lb. per acre showed a kill of 89 per cent.

T. tabaci is difficult to control as there are always many individuals in the sheath of the leaf that are protected against treatment. A heavy application of 2·75 per cent. nicotine dust applied to onions showed little control. Apparently nicotine dust of this strength, even though in excessive quantities, will not control the thrips in the sheath of the leaves when applied with a hand duster, though those on the exposed part of the leaves were killed. With the majority of hand dusters, it is necessary to use a larger amount of dust to cover the plants thoroughly than is required with a power duster that drives the dust with greater force into every part.

HASEMAN (L.), SULLIVAN (K. C.), TURNER (N.) & DAVIS (G. L.). [**Miscellaneous Pests in 1923-24.**]—*Missouri Agric. Expt. Sta.*, Bull. 228, pp. 47–52. Columbia, Mo., January 1925.

In experiments for the control of cucumber beetles [*Diabrotica* spp.] a dust containing 25 per cent. calcium cyanide scorched the plants badly and only temporarily disabled the beetles. One of lime plus 10 per cent. calcium arsenate and another of gypsum with 5 per cent. calcium arsenate protected the plants as long as they were covered with the materials, and there was no scorching. Gypsum alone gave greater promise, as very little of the foliage was eaten.

Experiments in the control of the codling moth [*Cydia pomonella*, L.], in which samples of tips and calyx cups were taken after spraying at various pressures, showed that in some cases low pressures did not leave sufficient lead arsenate to kill the larvae, the lethal dose for third instar and older codling moths being approximately ·0005 grams of powdered lead arsenate. Calcium cyanide as a barrier to migrating chinch bugs [*Blissus leucopterus*, Say], proved effective, when flakes were sprinkled each afternoon in a ploughed furrow at the rate of 1 lb. to 60 ft. Against San José scale [*Aspidiotus perniciosus*, Comst.], a 2 per cent. commercial oil and soap emulsion gave the best results, and a proprietary miscible oil, 1 : 15, was sometimes equally effective, but serious injury to some of the trees was evidently caused by the oil emulsion. Lime-sulphur, 1 : 7, killed 99 per cent. or more of the scales. Lubricating oil emulsions have been used extensively during the past two years as a dormant spray, and also as a summer spray on apple trees, but they did not prove effective against apple Aphids. Even a 10 per cent. oil emulsion as a dormant spray did not give satisfactory control. Lime-sulphur was also ineffective. The common grain Aphid, *Aphis avenae*, F., has caused most trouble on apples during the past two years. It migrates to apple from cereals in autumn and oviposits in the small twigs and buds. Three or four generations occur on apple in the spring before migration to grain crops begins.

Russell (H. L.), Morrison (F. B.) & Ebling (W. H.). **Annual Report of the Director, 1923-24.**—*Wisconsin Agric. Expt. Sta.*, Bull. 373, 99 pp., 39 figs. Madison, Wis., April 1925.

A brief account is given of the year's work in controlling grasshoppers, a new bait being described [*R.A.E.*, A, xiii, 242]. The apparatus constructed for collecting the pea aphis [*Illinoia pisi*, Kalt.] [*cf. R.A.E.* A, xii, 396] has been improved and found satisfactory in the field.

Jewett (H. H.). **The Grape Leafhoppers of Bluegrass in Kentucky.**—*Kentucky Agric. Expt. Sta.*, Bull. 254, pp. 87–130. Lexington, Ky., August 1924. [Received 9th July 1925.]

During 1920–22 a number of leafhoppers were found on grapevines in Kentucky, the most important of which are *Erythroneura comes* var. *octonotata* and *E. vulnerata*; *E. vitis* was present in considerable numbers in 1921 and 1922. *E. comes* was also common at times, but *E. tricincta* and *E. ziczac* were rare. The life-history of all except the last two is described, and is very similar in all cases. Hibernation occurs in the adult stage under leaves or rubbish near or in the vineyard. The leafhoppers leave the grape-vines about October for their hibernation quarters. Before migrating back in the spring, they are found on a great variety of plants.

The measures recommended are nicotine sulphate sprays against the nymphs [*R.A.E.*, A, xii, 305]. The proportion of 1 pt. to 175 gals. is considered slightly more effective than 1 to 200 [*loc. cit.*]. The sprays may be mixed with Bordeaux mixture. They must be directed to the lower surface of the leaves.

The life-history of a species of *Erythroneura* occurring on sycamore is described; it has a very similar one to that of the other species but only breeds on this tree. In a footnote Mr. H. Garman states that it only occurs on grapes by accident and never breeds on them. It has frequently been recorded as *E. comes*, and the characters distinguishing it are described.

Webster (R. L.). **Insects affecting Stems of Wheat and other Small Grains in North Dakota.**—*North Dakota Agric. Expt. Sta.*, Circ. 25, 20 pp., 22 figs. Agric. Coll., N. Dak., March 1925.

The species dealt with are *Meromyza americana*, Fitch (wheat-stem maggot), *Oscinella* (*Oscinis*) *frit*, L. (frit fly), *Cephus cinctus*, Nort. (western wheat-stem sawfly), the Noctuid, *Papaipema nitela*, Gn., which only occasionally attacks wheat, and *Mayetiola* (*Phytophaga*) *destructor*, Say (Hessian fly). A short account of each insect, its habits, life-history and control is given.

Morgan (A. C.). U.S. Bur. Ent. **Six New Species of *Frankliniella* and a Key to the American Species.**—*Canad. Ent.*, lvii, no. 6, pp. 136–147. Orillia, Ont., June 1925.

In America 24 species and 5 varieties of *Frankliniella* are recognised. The new species of these thrips include *F. gilmorei* from Tennessee, on mint; *F. canadensis* from the United States and British Columbia, on apple, peach, prune, cherry, clover, lupins, etc.; and *F. trehernei* from British Columbia on buckwheat, clover, yarrow and chicory.

(K2734) Wt P7/D23 1,500 9/25 H & Sp Gp 52 28

Braun (A. F.). **New Microlepidoptera from the Southwest.**—*Canad. Ent.*, lvii, no. 6, pp. 147–150. Orillia, June 1925.

The species described, all of which are leaf-miners, are *Lithocolletis manzanita* on manzanita (*Arctostaphylos manzanita*); *L. inusitatella* on *Quercus agrifolia*; *L. cretaceella* on *Q. hypoleuca*; *L. arizonella* and *Acrocercops arbutella* on *Arbutus arizonica*; and *Leucoptera robiniella* on *Robinia neomexicana*. The first two are from California, the others from Arizona.

Graf (J. E.). **Sweet Potato Weevil Eradication.**—*Jl. Wash. Acad. Sci.*, xv, no. 4, p. 79. Baltimore, Md., 19th February 1925.

The sweet potato weevil, *Cylas formicarius*, F., which is widely distributed throughout the tropics, was first found in the United States near New Orleans about 1875, having apparently been imported from Cuba. The spread of the weevil was very slow, the Gulf coast gradually becoming generally infested. All the food-plants are Convolvulaceae; seven species of *Ipomoea* are attacked, four being favourite food-plants.

Bartlett (O. C.). **Plant Inspection and Quarantine Laws, Orders and Regulations applying in the State of Arizona.** 83 pp. Phoenix, Ariz., 15th March 1923. [Received 13th June 1925.]

The legislation dealing with plant pests and diseases in Arizona is collected and reprinted in pamphlet form.

Woglum (R. S.) & la Follette (J. R.). **Control of the Resistant Black Scale.**—*Calif. Citrogr.*, ix (1924), no. 10, pp. 376, 386, 387, 394, 1 fig. (Abstract in *Expt. Sta. Record*, lii, no. 4, p. 357. Washington, D.C., March 1925.) [Received 6th July 1925.]

The information in this paper on *Saissetia oleae* has been noticed from another source [*R.A.E.*, A, xii, 529].

Kelly (R. W.). **Fumigation checks Aphis.**—*Citrus Indus.*, v (1924), no. 6, pp. 8–9 & 32, 3 figs. (Abstract in *Expt. Sta. Record*, lii, no. 4, p. 357. Washington, D.C., March 1925.) [Received 6th July 1925.]

Fumigation experiments with calcium cyanide against Aphids on *Citrus* in Florida show that a minimum period of 3 minutes is advisable for all sizes of tents. Three puffs from a hand duster are sufficient for a tent 3 ft. high, 5 puffs for a tent 5 ft. high, etc. The mixture used was 75 per cent. calcium cyanide and 25 per cent. dusting sulphur. Open-air dusting kills a large number of Aphids, but not an economic proportion. The percentage of toxicity was found to depend more on the dosage than on the time.

Ballard (W. W.) & Simpson (D. M.). **Behaviour of Cotton planted at different Dates in Weevil-control Experiments in Texas and South Carolina.**—*U.S. Dept. Agric.*, Dept. Bull. 1320, 43 pp. 5 pls., 10 figs. Washington, D.C., April 1925. [Received 9th July 1925.]

In order to obtain data on the growth and fruiting habits of early and late planted cotton in relation to the cultural control of the boll

weevil [*Anthonomus grandis*, Boh.], many experiments were made in 1923, and comparisons were drawn between the behaviour of early and late plantings in Texas and South Carolina. The differences in the rates of growth and the fruiting habits of the plants are discussed in detail. In view of the variations in these results and of the fact that the later rows of successive plantings were only partly protected against weevils from the earlier rows, the experiments were in no way conclusive.

MUTCHLER (A. J.) & WEISS (H. B.). **Beetles of the Genus** *Conotrachelus* **known to occur in New Jersey.**—*New Jersey Dept. Agric.*, Circ. 87, 22 pp., 6 pls. Trenton, N.J., May 1925.

Brief accounts are given of the 16 species of *Conotrachelus* known to occur in New Jersey, including *C. nenuphar*, Herbst (plum curculio), which attacks plums, peaches, cherries, quinces, apples, etc.; *C. juglandis*, Lec. (butternut curculio), which appears to confine its attacks to butternut (*Juglans cinerea*) and to introduced walnuts of the butternut type; *C. affinis*, Boh. (hickory-nut curculio) on immature hickory nuts, especially *Carya* (*Hicoria*) *glabra* and *C. ovata*; *C. seniculus*, Lec. (amaranth curculio); *C. elegans*, Say (pig-nut leaf curculio) on pig-hickory (*Carya glabra*); *C. aratus*, Germ. (hickory-shoot curculio) on *C. minima*, *C. ovata*, *C. alba*, *C. glabra* and *C. pecan*; *C. crataegi*, Walsh (quince curculio); *C. naso*, Lec. (larger acorn curculio); *C. posticatus*, Boh. (smaller acorn curculio); *C. anaglypticus*, Say (cambium curculio) on peach and the bark of other fruit and shade trees; and *C. fissunguis*, Lec. (hibiscus seed-capsule curculio). A key to these weevils is given, with notes.

[**Insect Pests in New Hampshire in 1924.**]—*New Hampshire Agric. Expt. Sta.*, Bull. 216, pp. 7–8 & 19. Durham, N.H., February 1925.

The European corn borer [*Pyrausta nubilalis*, Hb.] was again found to have two generations a year in New Hampshire; the seasonal history, with the dates of larval emergence, etc., are given. Though this moth was more widely distributed than in 1923, it did not occur in large numbers in any specific locality. No parasites were found.

Papaipema nitela, Gn. (stalk borer) has been relatively abundant for many seasons. Of the larvae collected in the field, 11·76 per cent. were parasitised by Tachinids. Studies on the effect of insecticides and fungicides on plants indicate that in the case of plants not sensitive to copper an alkaline Bordeaux mixture may cause injury to young leaves when a neutral mixture will not. In the case of plants sensitive to copper, such as peach, alkaline washes are more injurious to young foliage than neutral mixtures.

TRAPPMANN (W.). **Die Bekämpfung der Orangenschildlaus in Kalifornien, ein Beispiel für die Organisation einer biologischen Bekämpfung.** [The Control of the Orange Mealy Bug in California, an Example of the Organisation of Biological Control.] *Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 7, pp. 55–56. Berlin, 1st July 1925.

This account of the biological control of mealybugs, *Pseudococcus*, in California is largely taken from a report already noticed [*R.A.E.*, A, xiii, 249].

HOUGH (W. S.). **The Internal Anatomy of the Clover Root Mealy-bug, *Trionymus trifolii*, Forbes (Homoptera, Coccidae).**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 25–29, 6 figs. London, July 1925.

This paper presents the more important features of the internal anatomy of *Trionymus trifolii*, Forbes, a subterranean oviparous mealy-bug commonly found on the roots of clover in the eastern part of the United States. The male is unknown.

CHAMBERLIN (J. C.). **Supplement to a Monograph of the Lacciferidae (Tachardiinae) or Lac Insects (Homopt., Coccidae).**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 31–41, 1 fig. London, July 1925.

In this supplement to his monograph [*R.A.E.*, A, xi, 550], the author criticises a recent paper on lac insects by S. Mahdihassan [*R.A.E.*, A, xii, 5]. The substitution of *Laccifer* for *Tachardia* [*R.A.E.*, A, xii, 214] is accepted, and a new subfamily LACCIFERINAE is erected. The new species described are *Laccifer javanus* from Java on *Ficus* sp., and *L. rangoonensis* from Burma on *Quisqualis*.

LAING (F.). **Descriptions of some New Genera and Species of Coccidae.**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 51–66, 15 figs. London, July 1925.

The new species described are :—*Halimococcus nesiotes*, from Lord Howe Island on a palm ; *Phenacoccus trinidadensis*, from Trinidad on *Coccoloba uvifera* ; *Pseudococcus hargreavesi*, from Uganda on *Bauhinia* sp. ; *P. ugandae*, from Uganda on *Grevillea robusta* ; *Farinococcus simmondsi*, from New Britain on coconut ; *Kuwanina hilli*, from Queensland on onion-weed ; *Ceroplastes ritchiei*, from Tanganyika Territory on fruit of soursop (*Anona*) ; *Cyphococcus* (gen. n.) *caesalpiniae*, from Uganda on *Caesalpinia dasyrachis* ; *Lecanium inopheron*, from Uganda on *Erythrina* sp., and from S. Nigeria on cotton ; *Platylecanium cocotis*, from New Hebrides on coconut ; *Cryptostigma saundersi*, from Brazil ; *Chionaspis hargreavesi*, from Uganda ; *Phenacaspis australis*, from New South Wales, probably on *Eucalyptus* sp. ; *Operculaspis* (gen. n.) *crinitus*, from Tanganyika Territory on a forest tree ; *Lepidosaphes marshalli*, from New Zealand on *Freycinetia banksi* ; and *L. diplasia*, from Tanganyika Territory.

Tylococcus formicarii, Green, and *T. simplicior*, Green, from Ceylon should be transferred to the genus *Farinococcus*.

MARSHALL (G. A. K.). **New Curculionidae attacking Cultivated Plants (Col.).**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 67–75, 2 figs., 1 pl. London, July 1925.

The following new species are described :—*Protostrophus edax*, from the Transvaal, and *P. lugubris*, from Natal, both injurious to cotton seedlings ; *P. mutator*, from Cape Province, infesting beans ; *P. vorax*, attacking young cotton plants and *P. rotundus*, destroying maize and *Sorghum*, both from the Transvaal ; *Mecostylus acuminatus*, from Kenya Colony on coffee ; *Sympiezotrachelus impar*, from Natal on sugar-cane ; *Echinocnemus oryzae*, from Madras on roots of rice ; and *Anthonomus cyprius*, from Cyprus on buds of peach trees.

COTTERELL (G. S.). **The Hispid Leaf-miner** (*Coelaenomenodera elacidis*, **Maul.**) **of Oil Palms** (*Elaeis guineensis*, **Jacq.**) **on the Gold Coast.**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 77–83, 5 figs. London, July 1925.

Coelaenomenodera elaeidis, Maul., is indigenous to the West Coast of Africa, and though it has not hitherto been recorded outside the Gold Coast, it probably occurs throughout the West Coast oil-palm belt. Former outbreaks occurred in 1909–10 and 1919, but were checked in each case by the following rainy season. The present attack (consisting of two invasions) began at the beginning of the rains in July, and was confined to a small area. This outbreak was also checked by natural means. Palms of all ages are attacked, except those under 3 or 4 years. The larvae mine under the epidermis, attacking the leaflets soon after they have unfurled. Other food-plants are coconuts, *Borassus* and certain ornamental palms, but they are only attacked during a severe attack on surrounding oil palms; the life-history on these different food-plants is prolonged, and very few of the larvae mature. The adults may also feed on these, as well as other palms, and sometimes even on elephant grass.

The eggs are inserted in the lower side of the leaflets, and hatch in about 28 days. The larval life lasts 40 to 44 days, depending on climatic conditions. The pupal period varies from 15 to 22 days, the life-cycle, from oviposition to the emergence of the adult, occupying from 82 to 94 days.

The outbreaks were characterised by a southerly migration, which is probably caused by an increase in the numbers of the beetle and resulting shortage of food. The cause of the periodic increase is unknown, but may possibly be indirectly due to storms, which presumably would seriously affect the parasites. Very few adults emerged from the generation arising from the second invasion owing to the activities of parasites. These are chiefly Hymenoptera such as the two egg parasites, *Closterocerus africanus*, Wtstn., and *Achrysocharis leptocerus*, Wtstn.; and the larval parasites, *Dimmockia aburiana*, Wtstn., and *Cotterellia podagrica*, Wtstn., both heavily parasitised by *Pleurotropis nigripes*, Wtstn. As a result of the high humidity, entomogenous fungi are common. Owing to parasitism, it is unlikely that *Coelaenomenodera elaeidis* will ever become a serious pest, though periodic outbreaks may occur under favourable conditions. Artificial remedial measures are impossible in the Gold Coast. Shaking the leaves in the early morning or evening might be effective, but would require too much labour. Pruning and burning the lower leaves at definite periods would destroy the more fully grown larvae, and should be effective in a small way.

WIMSHURST (F. M.). **The Cherry Black Fly** (*Myzus cerasi*).—*Bull. Ent. Res.*, xvi, pt. 1, pp. 85–94, 6 figs. London, July 1925.

In discussing the systematic position of this Aphid, the author considers that the identity of *M. aparines*, Kalt., with *M. cerasi*, F. [*R.A.E.*, A, iii, 638], must be left an open question. In Kent, *M. cerasi* has only been found to migrate to *Galium aparine*.

The date on which the eggs hatch varies according to weather conditions; in 1923 they all hatched by 1st March. The larval life also varies with the weather conditions; the young fundatrices are first found among the clusters of cherry buds at the tips of the branches; when the buds open they collect upon the stalks of the flowers and

leaves. Their offspring are apterous viviparous females, of which several generations occur in May. All through June and July numbers of winged forms are produced on the cherry, and as these migrate as soon as they are mature, the broods tend to get smaller towards the end of July. A large number of the apterous individuals are destroyed by natural enemies, chiefly Coccinellids, Syrphid larvae and parasitic Hymenoptera. On *Galium aparine* winged viviparous females were found breeding in June and July, their offspring being apterous viviparous females. About the middle of September winged forms appear in these broods and soon afterwards can be found singly on the lower side of cherry leaves. These give rise on the cherry to oviparous females. About the same time winged males are produced on *G. aparine*. They soon fly to cherry, where they pair with the oviparous females. The eggs are laid amongst the scales just below the cherry buds, where they can withstand the winter. Though it is possible for the species to reproduce entirely on cherry during the whole summer, and to produce oviparous females there, the alternate food-plant is necessary to complete the life-cycle, as without it no males are produced. If the winter egg cannot be laid without the males from the alternate food-plant, a good deal can be done in reducing the numbers of the Aphid by cutting hedges and clearing away patches of *G. aparine* before October when the males appear. By cutting early in September or earlier the winged female sexuparae will also be destroyed. The following natural enemies of *M. cerasi* have been observed: *Aphidius* spp., on cherry; *Ephedrus lacertosus*, Hal., and *Lygocerus aphidivorus*, Kieff., on cherry and *G. aparine*, and, on the latter only, *Trioxys brevicornis*, Hal., *Aphidius cerasi*, Marsh., and *Allotria flavicornis*, Htg.

WHITFIELD (F. G. S.). **The Natural Control of the Leaf-miner *Phytomyza aconiti* Hendel (Diptera) by *Tachydromia minuta*, Meigen (Diptera).**—*Bull. Ent. Res.*, xvi, pt. 1, pp. 95–97, 3 figs. London, July 1925.

Phytomyza aconiti, Hendel, recorded for the first time from Britain, was found on delphiniums at Streatley-on-Thames. A detailed account is given of the gradual increase of this infestation and its subsequent disappearance as a result of the increased abundance of an Empid, *Tachydromia minuta*, Meig., that preys upon *P. aconiti*. It would seem that some use might be made of the smaller predacious Diptera, by introducing them into greenhouses infested by pests similar to *P. aconiti*. The smaller Empids in particular might be of use in controlling Aleurodids.

WILLIAMS (C. B.) & BISHARA (I. E.). **The Survival of Pink Boll Worm Larvae in Buried Seed during the Winter in Egypt.**—*Egypt Minist. Agric.*, Tech. & Sci. Service, Bull. 58, 7 pp., 2 pls. Cairo, 1925.

In these experiments a number of samples, containing roughly 200 double seeds, that is, seeds spun together by the resting larvae of *Platyedra* (*Gelechia*) *gossypiella* were buried at different dates and at different depths in a variety of fields. The results completely confirm those obtained by Willcocks [*R.A.E.*, A, ix, 73] with cotton bolls. The death rate of the larvae increases directly with the increased depth, none of them surviving at 12 inches. The more moist the land is kept

during the winter, the more rapid is the death rate. Artificial watering every 2 weeks, or a very heavy continual watering for a short period, increases the death rate; under these conditions no moths reached the succeeding crop.

WILSON (F. E.). **Bird Enemy of Emperor Gum Moth Larvae.**—*Victorian Nat.*, xlii, no. 1, p. 22. Melbourne, May 1925.

The black-faced cuckoo-shrike, *Graucalus melanops*, is recorded as a useful natural enemy of the emperor gum moth, *Antheraea eucalypti*, the caterpillars of which infest *Eucalyptus*.

Destructive Insect and Pest Act. Regulation no. 14 (Foreign), 1st Revision.—*Canada Dept. Agric.*, 1 p. Typescript. Ottawa, Ont., 22nd June 1925.

To prevent the introduction of the oriental peach moth [*Cydia molesta*, Busck], the importation into Canada of fresh peaches and peach nursery stock from Wisconsin, Illinois, Missouri, Arkansas, Mississippi and the area east of these States is prohibited. Importation from other States is only permitted if the shipment is accompanied by a statement as to where the peaches were grown. The importation into British Columbia of peach fruit pits or seeds for propagation is also prohibited from the above-mentioned States.

Plant Protection Ordinance, no. 10 of 1924. Regulations. Instructions regarding Inspection, Fumigation and Disinfection of Plant Imports into Ceylon. 3 pp. Typescript. Peradeniya, 23rd May 1925.

For six months from 1st June 1925 all plant imports (except seed in hermetically sealed tins) into Ceylon must be sent to the fumigatorium for inspection and, if necessary, treatment. Seeds in packets or bags must also be sent to the fumigatorium. All cotton seed for propagation must be fumigated, as must cotton seed for consumption from the Western Hemisphere; other cotton seed for consumption is allowed entry without inspection. Fruits from Mediterranean, Australian, Indian, Californian or other American ports found infested with scale-insects or fruit-flies are fumigated. The methods of fumigation are described in detail.

Quarantine Proclamation no. 138.—*Commonw. Australia Gaz.*, no. 47. Melbourne, 11th June 1925.

Quarantine Proclamation no. 126 [*R.A.E.*, A, xii, 516] is repealed, and the importation into Australia of broom corn millet is prohibited as a precaution against the European corn borer, *Pyrausta nubilalis*.

DAVIES (W. M.). **Investigations of Spring-tails attacking Mangolds.**—*Jl. Minist. Agric.*, xxxii, no. 4, pp. 350–354, 1 pl. London, July 1925.

The injury to mangolds known as "black leg" or "strangle" is due to the attacks of springtails. The amount of damage done is variable, though it may reach serious proportions, as shown in 1925 near Bangor, where 25-30 per cent. of the crop was destroyed.

The following species of springtails were collected: *Bourletiella hortensis*, Fitch, *Isotoma viridis*, Bourlet, *Isotomerus palustris*, Müll., *Smynthurus viridis*, L., *Bourletiella lutea*, Lubbock, and *Dicyrtominia minuta*, F. *B. hortensis* was found on every leaf examined and was also present on the roots. *S. viridis* was also abundant. *Isotoma viridis* and *Isotomerus palustris* were confined to the roots and the soil. Holes are eaten in the leaves and the roots are gnawed, causing malformation and breaking at the point of attack. The other species were less abundant and occurred both on leaves and roots.

Of the various remedies tested, the best results were obtained with a 5 per cent. nicotine sulphate dust, equivalent to 2 per cent. pure nicotine. This was effective against the species of *Isotoma* and *Isotomerus* and *S. viridis*, but *B. hortensis* dispersed to where the dust did not reach it. A 1 per cent. green tar oil dust proved an active repellent, springtails of all species moving away rapidly from the plants dusted. The action of pyrethrum powder is somewhat that of a repellent. Fine air-slaked lime is a useful contact insecticide, though less effective than nicotine sulphate.

STENTON (R.). **Introduction of a Parasite of the Woolly Aphis.**—*Jl. Minist. Agric.*, xxxii, no. 4, pp. 343–349. London, July 1925.

Aphelinus mali has been introduced into England from France, and in spite of the unfavourable conditions of 1924, it has apparently become established in various districts, causing considerable reduction in the abundance of *Eriosoma lanigerum*. The life-history of the parasite is briefly outlined. The generations overlap considerably. The winter is passed as a larva in the dried skin of the host attached to a twig or bough. In this stage it may be easily transferred from one locality to another. Natural dispersion is greatly favoured by warm sunny weather.

SKEETE (C. C.). **Entomological and Mycological Work.**—*Rept. Dept. Agric. Barbados, 1923–24*, pp. 8–10. Barbados, 1925.

No improvement has occurred in the situation regarding the prevalence of *Diaprepes abbreviatus*, L. (root borer) and *Lachnosterna smithi*, Arrow (brown hardback) on sugar-cane in Barbados since the last report [*R.A.E.*, A, xii, 407], and in most districts *Diatraea saccharalis*, F. (moth borer) was also found. The parasites that were being introduced from Demerara were found not to belong to the genus *Iphiaulax* as recorded [*loc. cit.*], but comprised *Ipobracon grenadensis*, Ashm., *I. puberulus*, Szep., *Microdus diatraeae*, Turn., and *Microdus* sp. Unfortunately, there is as yet no evidence that these parasites have become established in the Island, but a further attempt will be made to introduce them.

On cotton, *Platyedra* (*Pectinophora*) *gossypiella*, Saund., has become established in several cotton-growing districts during the season, and *Alabama argillacea*, Hb., and *Aletia luridula*, Guen., were severe pests where dusting with Paris green was not carried out. *Eriophyes gossypii*, Banks (leaf blister mite) was observed several times, but never in great numbers. During a severe drought, Aphids appeared in large numbers, but were checked by their natural enemies, *Chrysopa* sp. and the Coccinellids, *Cycloneda sanguinea*, L., and *Megilla maculata*, DeG.

Coconut palms in one part of the coast were attacked by the Coccids, *Vinsonia stellifera*, Westw., and *Diaspis boisduvali*, Sign., and by *Aleurodicus cocois* (coconut whitefly), all of which can be controlled by spraying with fish-oil soap or kerosene emulsion. The most troublesome tree pest was the Cossid moth, *Duomitus punctifer*, Hamp., the larvae of which destroyed large branches and sometimes entire trees. Those most commonly attacked are *Tecoma leucoxylon* (whitewood), *Persea gratissima* (avocado pear) *Albizzia lebek* (ebony), *Artocarpus incisa* (breadfruit) and *Achras sapota* (sapodilla).

Roses are frequently attacked by *D. abbreviatus* and *L. smithi*, and infested plants should be dug up and the soil underlying the roots for about 3 ft. should be searched, and the grubs destroyed. During the rainy season the adults can be collected from the leaves at night.

Proceedings of the Section of Apiculture of the American Association of Economic Entomologists.— *Jl. Econ. Ent.*, xviii, no. 3, pp. 441–468. Geneva, N.Y., June 1925.

This account of the proceedings of the Section of Apiculture includes the following papers : The Seventh International Apicultural Congress (E. F. Phillips) ; Notes on Bee Diseases in Connecticut (P. Garman) ; Federal Co-operation in Apiary Inspection proposed (S. B. Fracker) ; Inspection Methods in Various States, Symposium.

Sasscer (E. R.). **Plant Quarantine, past, present and future.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 468–472. Geneva, N.Y., June 1925.

The following is from the author's abstract of this paper: A brief history of the plant quarantine work of the United States is given, including a short review of the necessity for and efforts put forth to secure the passage of the Plant Quarantine Act. A short résumé of the various fields covered by quarantine activities, the type of men employed in this work, and methods of certifying and safeguarding the plants and plant products shipped interstate (including fumigation with hydrocyanic acid gas) is given.

Plank (H. K.). **The Camphor Scale Situation.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 473–481. Geneva, N.Y., June 1925.

Pseudaonidia duplex, Ckll. (camphor scale) is becoming a serious problem in Alabama, Louisiana and Texas, where some 150 species of plants are attacked, including Japanese persimmon, sweet olive, *Camellia*, Satsuma orange, rose and Japanese honeysuckle, which are particularly susceptible to attack, and common fig and privet, which are also preferred food-plants. The damage done to *Citrus* is particularly important as the scale is active through the greater part of the year and attacks all green parts of the *Citrus* tree, while the infestation of the fruit when ripening renders it unfit for market. The scale seems able to survive relatively severe weather conditions. While wind plays some part in its dissemination, the movement of infested plants is undoubtedly the chief means of distribution. Oil sprays have given good results against *P. duplex*. All heavily infested trees, except *Citrus* and very tender plants, should be pruned and then sprayed once in autumn and again in early spring with a heavy lubricating oil emulsion diluted to contain 2 per cent. of oil. *Citrus* and other tender plants should receive the same treatment, but light

lubricating oil should be used to avoid scorching. Two additional summer applications (about 15th May and 30th July) against the immature stages of the first and second generations are sometimes advisable, using 1 per cent. heavy oil emulsion for the more resistant plants and 1 per cent. light oil emulsion for the tender plants. Fumigation, although apparently satisfactory for practical purposes, has not given complete control of all stages. For each 1,000 cu. ft. of space, $\frac{3}{4}$ oz. of sodium cyanide in $2\frac{1}{2}$ fluid oz. of water and $1\frac{1}{8}$ fluid oz. of sulphuric acid is required, an exposure of 1 hour being given when the temperature is 80° F. or more. At lower temperatures, 1 oz. of sodium cyanide in 3 fluid oz. of water and $1\frac{1}{2}$ fluid oz. of sulphuric acid should be used for the same space and exposure.

ROGERS (D. M.). U.S. Bur. Ent. **The Methods employed in Enforcing the Gipsy Moth and Brown Tail Moth Quarantine.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 481–487. Geneva, N.Y., June 1925.

The organisation and working of Quarantine no. 45 [*R.A.E.*, A, xi, 518], directed against the gipsy moth [*Porthetria dispar*, L.] and the brown-tail moth [*Nygmia phaeorrhoea*, Don.], are described in detail.

STOCKWELL (C. W.). **The Japanese Beetle Quarantine.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 488–491. Geneva, N.Y., June 1925.

The Japanese beetle [*Popillia japonica*, Newm.] now covers an area of infestation of 1,522 square miles in New Jersey, Pennsylvania and Delaware, all of which is under quarantine. As there are thousands of farms producing for export, while large quantities of fruit and vegetables are imported into Philadelphia for distribution, the problem of quarantine is a difficult one, and has been divided into two distinct phases: Farm products quarantine, which has to deal with the insect in the adult stage only, and nursery quarantine. Under the first head the restrictions on farm produce are effective only from 15th June to 15th October, during which period the articles most likely to serve as carriers of adult beetles are either refused shipment from the quarantined zone or allowed shipment upon inspection and certification. The nursery quarantine regulates the movement of all nursery and greenhouse stock, etc. [*R.A.E.*, A, viii, 512].

BARBER (G. W.). U.S. Bur. Ent. **Remarks on the Number of Generations of the European Corn Borer in America.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 496–502. Geneva, N.Y., June 1925.

The author, carrying on investigations previously noticed [*R.A.E.*, A, xii, 177], gives the following abstract of this paper: The theory that there are at present two geographical races of the European corn borer, *Pyrausta nubilalis*, in America is discussed. Larvae transferred from New York to Massachusetts in 1920 have for four years maintained a single annual generation, while larvae from Massachusetts that had a single generation during 1920 have been reared under the same conditions, and have had a partial second generation each year. The fact that individuals in the infested area about Lake Erie are practically all large and well-nourished, while in New England many larvae enter hibernation in the autumn half starved and from a third

to a half smaller than normal larvae suggests the theory that the infestation about Lake Erie will be more dependable from year to year. This has proved to be the case during 1923 and 1924, when the New England infestation has decreased and the infestation about Lake Erie has increased both as to spread and in intensity of infestation. The theory that the New England infestation may be reverting to a single generation habit by a process of natural selection in view of an environment that will not support two annual generations is also discussed.

HAMILTON (C. C.) & SMITH (C. M.). **A Colorimetric Method for showing the Distribution and Quantity of Lead Arsenate upon Sprayed and Dusted Surfaces.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 502–509, 1 pl. Geneva, N.Y., June 1925.

A method shorter and easier than the standard Gutzeit method of arsenic determination has been devised for showing the quantity of lead arsenate upon sprayed surfaces. The best method for indicating the distribution of lead arsenate proved to be the "printing out" chemical method in which the sprayed surface is pressed upon blotting paper that has previously been saturated with a solution of sodium hydroxide, which dissolves the lead arsenate. The lead is then adsorbed by the paper, and the resultant print reproduces even the structural details of the leaf. Exposure to hydrogen sulphide gas transforms the lead into a visible form, lead sulphide, and thus detailed visual evidence is obtained of where the lead is and, roughly, how much of it there is. When it is desired to estimate more accurately the total quantity of lead arsenate present, it may be dissolved from the leaf by sodium hydroxide and the solution treated with hydrogen sulphide, gum arabic being used to prevent coagulation and precipitation. The colours developed are similar to those obtained by the printing process and can be estimated by comparison with prepared standards. These processes are described in detail.

SMITH (F. T.). **The Relation of Insects to the Transmission of Raspberry Leaf Curl.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 509–513. Geneva, N.Y., June 1925.

The author has made a study of the relationships of *Aphis rubiphila*, Patch, to the leaf-curl of raspberry, and has found as the result of many experiments that this was the only insect of many tested (including *Amphorophora ribis*, Kalt., which is common on red raspberries, red spiders, and two undetermined species of leaf-hoppers) that does carry raspberry leaf-curl. The Aphids must feed upon a diseased plant before becoming carriers. The infective agent is not carried over winter within the egg from the autumn generation to the spring forms and is not inherited by the offspring in viviparous reproduction. Leaf-curl was transmitted from black to red raspberries, but not *vice versa*. As raspberries are not generally sprayed, and in view of the fact that all the various mosaic diseases of this fruit have not been worked out to prove that spraying to kill the Aphids would be the proper method of control, it is recommended for the present to rogue out the diseased plants as soon as infection is noticed, and thus remove the sources of contagion. As the plants never recover after once being infected, this remedy is an economic one.

English (L. L.). **A Preliminary Report on the Preparation of Insecticide Emulsions with a Colloidal Clay.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 513–515. Geneva, N.Y., June 1925.

Investigations are described to determine the possibility of using a colloidal clay known as bentonite for the preparation of insecticide emulsions. The advantages of finely divided solids over soap are that no heat is required for their solution and they are not so subject to chemical influences. Fifty per cent. stock emulsions were prepared by allowing the bentonite to swell in water overnight, then adding the oil and agitating with an ordinary bucket pump. Kerosene emulsions made with 8 and 10 grams of bentonite per 100 cc. of tap water were stable after 6 weeks. Paraffin oil, red engine oil and furfural required only 4 or 6 grams of bentonite for emulsification and were stable after 2 weeks, the best furfural emulsions being made with 4 grams of bentonite in 100 cc. of water. Attempts to make stable emulsions of commercial furfural with soaps were negative. Tests with potted bean plants showed that emulsions of paraffin and red engine oils were much more injurious than either kerosene emulsion or three proprietary miscible oils tried. Tests on the Aphid, *Amphorophora rhois*, Monell, indicated that paraffin and red engine oil emulsions compare favourably with miscible oils, kerosene emulsion being less effective than the other oils. Furfural emulsions at 15 per cent. strength gave approximately the same mortality as the other sprays at 2 per cent. strength. Emulsions made with soap were slightly more effective than those made with bentonite. Besides crude bentonite there is a finished product that has been dehydrated and reduced to pass through a 200 to 250 mesh sieve. These materials offer some possibilities as emulsifiers, but their use should be further investigated before recommendations are made.

Frost (S. W.). **The Delayed Dormant Oil Spray for killing Apple Red-bug Eggs.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 516–519. Geneva, N.Y., June 1925.

Experiments were made to determine the effect of oil sprays on the eggs of *Lygidea mendax*, Reut. (red-bug). In home mixed emulsions, 1 or 1½ lb. calcium caseinate was mixed with 1 U.S. gal. of water, to which 3 U.S. gals. of red engine or kerosene oil was added and thoroughly mixed, the mixture being then diluted with 99 U.S. gals. of water, giving a 3 per cent. oil emulsion. No injury was observed on the foliage. Several commercial oils also were used. It was found that neither lime-sulphur applied in the dormant or delayed dormant period, nor oils applied in the dormant period would kill eggs of *L. mendax*. Oil sprays were then applied as a delayed dormant spray, after the buds had burst and the young leaves were protruding ½ to ¾ in. from the buds. Lime-sulphur, even when applied at such a late date, did not give control, but the oils were effective in killing a large percentage of the eggs, the actual results being shown in a series of tables.

Hoerner (J. L.) & Langford (G. S.). **The Sweep Method *v.* the Count Method for determining Grasshopper Infestation.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 519–520. Geneva, N.Y., June 1925.

There are two methods of determining grasshopper infestation: the sweep method, consisting of a series of sweepings, with usually

50 sweeps of the net to a sweeping, and the count method, consisting of a series of counts of the actual number of grasshoppers within a given area. This may be done by using a box of a yard square, with ropes attached to it so that the workers may stand some distance from the trap. It should be dropped quickly so as to trap all the grasshoppers within the area covered by it.

A comparison of the value of the two methods for testing the effect of a sodium arsenite poison bait was made in Colorado in a lucerne field infested with *Melanoplus* spp. If the second sweeping is done soon after the poison is applied it indicates a higher pecentage of control than the count method, owing to the fact that grasshoppers suffering from the effects of the poison do not jump, and are therefore not caught, but are counted as dead. Otherwise, both methods proved to be about equally accurate, but on the whole the sweep method is recommended as being easier to work and requiring less labour and time.

Common Names of Insects approved for General Use by the American Association of Economic Entomologists.— *Jl. Econ. Ent.*, xviii, no. 3, pp. 521–545. Geneva, N.Y., June 1925.

This useful list is in two parts, being arranged both under the popular and scientific names.

Yothers (W. W.). **Cold Process Oil Emulsions.**— *Jl. Econ. Ent.*, xviii, no. 3, pp. 545–546. Geneva, N.Y., June 1925.

Notes are given on the use of kaolin, glue and skimmed milk powders as emulsifiers for lubricating oils, all of which are easily prepared and reliable. For the first, 2⅔ lb. kaolin is dissolved in 1 U.S. gal. water without stirring, 2 U.S. gals. lubricating oil are then added and pumped twice with a bucket pump; this emulsion will mix to any dilution with water or lime-sulphur. The following glue formula is perhaps superior to soap and glue: 1 lb. ground glue is dissolved in 1 U.S. gal. water by soaking for 10 or 12 hours or by heating, 2 U.S. gals. lubricating oil are then added and pumped 3 times. This will mix with lime-sulphur solution or deep well water (hard water) but will probably ferment in a few days. The same remarks apply to a mixture of 14 to 16 oz. skimmed milk powder added slowly to 1 U.S. gal. water while beating vigorously, after which 2 U.S. gals. lubricating oil are added and pumped 3 times. This was much easier to make than when calcium caseinate was used.

Smith (R. H.). **Laboratory Experiments relating to Codling Moth Control.**— *Jl. Econ. Ent.*, xviii, no. 3, p. 546. Geneva, N.Y., June 1925.

In experiments with freshly hatched larvae of the codling moth [*Cydia pomonella*, L.] and the value of arsenicals in controlling them, the larvae were transferred to apples that had been sprayed uniformly with an atomiser in the laboratory. It was found that when 2 lb. lead arsenate was used to 100 U.S. gals., over 30 per cent. of the larvae entered the apples without being killed, even when the spray covering was

as nearly perfect as it could be. About 15 per cent. of the larvae stung the fruit so that practically 50 per cent. of the larvae caused injury of some kind. The mist type of spray was by far the least effective; the film or spreader covering effected scarcely any improvement in protection, as compared with the covering of large drops or deposits obtained when no spreader is used. By increasing the proportion of lead arsenate, and thus increasing the thickness of the film, better results were obtained, and the amount of injury was decidedly and consistently reduced. The indications therefore are that lead arsenate, especially in later cover sprays, is not nearly so effective in protecting apples from injury as has been generally supposed. Certain technical tests in the orchard agree with these laboratory experiments.

WILSON (C. C.). U.S. Bur. Ent. **An Improved Insect Net.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 546–547, 1 fig. Geneva, N.Y., June 1925.

An improvement on the ordinary insect net is described, in which, by means of a wire attachment, the net can be held open when required.

HUBER (L. L.). **Some Spray Tests with Oil Emulsions.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 547–548. Geneva, N.Y., June 1925.

An emulsion frequently undergoes certain quantitive changes during the process of manufacture. The ratio of oil and water and soap, the degree of mechanical mixture and the amount of heat applied to the mixture before emulsion are factors that, taken collectively, have an important effect on the increase in volume. As the oil is the killing element of an emulsion, its concentration should be known if tests are to be made comparatively. Data given in the form of tables show that the above factors, especially the ratio of oil, water and soap, have an important bearing on the control of Coccids. When using 1 U.S. gal. oil, ½ U.S. gal. water and 2 lb. soap, at a strength of 6 gals. of emulsion to 100 gals., with ·03 per cent. of oil in the spray solution, 100 per cent. of San José scale [*Aspidiotus perniciosus*, Comst.] was killed, lower strengths giving less effective control. With 1 U.S. gal. oil, ¼ U.S. gal. water and 1 lb. soap, 100 per cent. mortality was obtained with 6 gals. of emulsion to 100 gals. of water with ·04 per cent. of oil in the spray solution, lower strengths again giving poorer results.

BARBER (G. W.). **Notes on the Corn Earworm in Eastern Massachusetts.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 548–549. Geneva, N.Y., June 1925.

Heliothis obsoleta, F. (corn earworm) was unusually abundant in Massachusetts in 1921, and, though less numerous, was a troublesome pest in the following years. Full-grown larvae were found on August 9th 1924, and those of a second generation were mature by mid-October, so that two generations occurred in that area in the year. Observations during the winter showed that the insect is unable to withstand freezing temperatures, both pupae in the soil and larvae in the ears of maize being killed by frost.

Shepard (H. H.). **Notes on** *Thrips tabaci*, **Lindeman.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 549–550. Geneva, N.Y., June 1925.

As various observations have been made regarding the shortness of adult life of *Thrips tabaci*, Lind. (onion thrips), the author records having kept some individuals as long as 50 and, in one case, 58 days.

Smyth (E. G.). **Why not Trap-crops that entrap ?**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 550–552. Geneva, N.Y., June 1925.

It is suggested that an ideal trap crop would be one that would not only attract but also destroy insect pests unaided, and that apparently a few such plants do exist. The Leguminous plant, *Meibomia amans*, which is allied to the common beggar weed, growing in Mexico and Guatemala is covered on the stems and leaves with hooked hairs from which insects seem unable to escape, flies, Hymenoptera, small beetles and occasional leaf-hoppers being mostly found on them, though larger insects, even grasshoppers, are sometimes caught. Another undetermined species of the same genus was found to be the wild food-plant of *Epilachna corrupta*, Muls. (Mexican bean beetle) in one district and was attacked even in preference to cultivated beans. If *M. amans* proved equally attractive to *E. corrupta*, it might be utilised to great advantage by planting it around fields of beans. The South American grass, *Melinis minutiflora*, possesses marked adhesive properties, but is capable of trapping only small insects. Newly hatched ticks, as they attempt to climb up the stems are trapped and killed, and it is said that cattle pastured exclusively on this grass become entirely freed from ticks within a year, while it seems to be equal to most other grasses in nutritive value. It should also be useful planted between canefields to control leafhoppers or bordering sugar-beet fields where curly-top is a danger, while as a trap-crop for Aphids it is ideal.

Yothers (M. A.). U.S. Bur. Ent. **The Asparagus Beetle** (*Crioceris asparagi*, **Linn.**) **in Washington and other Pacific Coast States.**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 552–553. Geneva, N.Y., June 1925.

Previous records of *Crioceris asparagi*, L. (asparagus beetle) in the United States are given. It recently appeared in the Yakima Valley, Washington. Dusting with lead arsenate and hydrated lime (4 : 1) in July killed all larvae present and all adults except those that flew away, but not pupae or eggs.

Chandler (S. C.) & Porter (B. A.). **How soon after Spraying with Oil may Scale Control Results be safely scored ?**—*Jl. Econ. Ent.*, xviii, no. 3, pp. 553–554. Geneva, N.Y., June 1925.

Experiments during the winter of 1923–24 to test the effect of oil sprays against Coccids indicate that the temperature following the spray applications largely influences the period that must elapse before the results of the treatment can be determined. While one month is usually a sufficient time to allow the effect to become apparent, during continued cold weather the scales are very long in drying up, and a longer period must be allowed before the mortality is apparent. During summer weather, ten days is often long enough to allow between spraying and computation of the results.

GAHAN (A. B.). U.S. Bur. Ent. **A Second Lot of Parasitic Hymenoptera from the Philippines.**—*Philippine Jl. Sci.*, xxvii, no. 1, pp. 83–109, 1 pl. Manila, May 1925.

This paper contains 17 new species and one new genus, as well as notes on several previously described parasitic Hymenoptera.

The new species include *Spathus dinoderi* from *Dinoderus minutus*, F.; *Apanteles angustibasis* and *Brachymeria excarinata* from *Cnaphalocrocis medinalis*, Guen.; *Phaenocarpa* (*Asobara*) *bactrocerae* from *Dacus* (*Bactrocera*) *umbrosus*, F.; *Pycnetron curculionidis* from *Acicnemis filicornis*, Hubenthal; *Cerocephala* (*Parasciatheras*) *dinoderi* from *D. minutus*; *Tetrastichus clypeatus* from *Dynopsylla robusta*, Craw.; and *Phanurus rowani* and *P. dignus* from *Schoenobius incertellus*, Wlk.

CHITTENDEN (F. H.). U.S. Bur. Ent. **The Genus** *Coccotorus* **Leconte (Coleoptera).**—*Proc. Ent. Soc. Washington*, xxvii, no. 6, pp. 129–132, 2 figs. Washington, D.C., June 1925.

Coccotorus pruniphilus, sp. n., has been reared from *Prunus minutiflora* in Texas. A key is given to the three species of this genus, with notes on their distribution and habits.

ALDRICH (J. M.). **Two New Species of the Tachinid Genus** *Lixophaga* **with Notes and Key (Diptera).**—*Proc. Ent. Soc. Washington*, xxvii, no. 6, pp. 132–136. Washington, D.C., June 1925.

Lixophaga plumbea reared from *Rhyacionia frustrana*, Comst., and *Cydia* (*Laspeyresia*) *molesta*, Busck, in Virginia and from *Phalonia oenotherana*, Riley, in New Jersey, and *L. mediocris* reared from *R. frustrana* in Virginia are described.

MARCOVITCH (S.). **The Strawberry Root Louse in Tennessee.**—*Jl. Agric. Res.*, xxx, no. 5, pp. 441–449, 3 pls. Washington, D.C., 1st March 1925.

Aphis forbesi, Weed, occurs in all the strawberry-growing areas of Tennessee, but cannot be considered of any very great importance in that State. The entire life-cycle is spent on the strawberry plant, the winter being passed in the egg stage on the pedicels of the leaves. The initial feeding of the young stem-mothers occurs where they hatch; later they migrate to the tenderest leaves as these come out of the crown. The various stages and forms are described, and the effect of temperature and light is discussed [*cf. R.A.E.*, A, xii, 118, 364]. In Tennessee the ant, *Pheidole vinelandica*, For., is most commonly associated with this Aphid. As a rule the Aphid is kept in check by natural enemies, including a Syrphid, *Paragus tibialis*, Fall., an undetermined Chalcid, the Coccinellids, *Hippodamia convergens*, Guér., and *Coccinella novemnotata*, Hbst., and the Braconid, *Diaeretus fuscicornis*, Ashm.

COOK (W. C.). **The Distribution of the Alfalfa Weevil** (*Phytonomus posticus*, **Gyll.). A Study in Physical Ecology.**—*Jl. Agric. Res.*, xxx, no. 5, pp. 479–491, 12 figs. Washington, D.C., 1st March 1925.

Hypera variabilis, Hbst. (*Phytonomus posticus*, Gyll.) causes considerable damage to lucerne in the Great Basin region, and is rapidly

spreading to new territory. An attempt has been made to determine the probable economic distribution of this weevil in America. The present work includes a compilation of all known information concerning the effects of climatic factors on its life-history and abundance in America, the study of its distribution in Europe and Asia, and the application of the information to a study of climatic conditions in America.

The normal distribution of the weevil in America is restricted entirely to the sub-Pacific and Pacific rainfall regions. In the north, inside these regions, it is limited by low summer temperatures, on the east, on the edge of the sub-Pacific region, by heavy summer rainfall, and on the north-east, in the plains of Montana and Wyoming, by the summer rainfall and by low winter temperatures. No data are available for the determination of the Southern limit.

CRAIGHEAD (F. C.). U.S. Bur. Ent. **Relation between Mortality of Trees attacked by the Spruce Budworm** (*Cacoecia fumiferana* **Clem.) and previous Growth.**—*Jl. Agric. Res.*, xxx, no. 6, pp. 541–555, 5 figs. Washington, D.C., 15th March 1925.

These studies indicate that there is a definite correlation between the mortality occurring in spruce and fir stands and the rate of growth of these stands prior to attack by *Tortrix* (*Cacoecia*) *fumiferana*, Clem. (spruce budworm). The more rapid the growth as expressed in diameter increment, the lower the resulting mortality under equal conditions of attack. A comparison of the rate of growth of the trees surviving attack shows that the diameter growth for the 10 year period following the first year of attack is only about half that of the preceding 10 years. In hardwood types the overhead foliage of these trees protects the softwoods, but in mixed stands where softwoods are dominant, the mortality is as high as in pure softwood stands. It is therefore evident that the only means of protecting these trees is to keep the future forests in a condition least susceptible to the effects of defoliation. This may be accomplished by maintaining thrifty and vigorous stands. In natural stands judicious cuttings will reduce the density and promote more rapid increment in the individual trees. Recommendations are made as a guide for the selection of the trees for thinning according to the various types of forests.

CROSSMAN (S. S.). U.S. Bur. Ent. **Two Imported Egg Parasites of the Gipsy Moth,** *Anastatus bifasciatus* **Fonsc., and** *Schedius kuvanae* **Howard.**—*Jl. Agric. Res.*, xxx, no. 7, pp. 643–675, 11 figs. Washington, D.C., 1st April 1925.

The life-history, distribution and colonisation of *Anastatus bifasciatus*, Boy., and *Schedius kuvanae*, How., are described in detail, the information being summarised by the author as follows :—

Two egg parasites of *Porthetria dispar*, L. (gipsy moth) have been established in America. *S. kuvanae* was introduced from Japan, its only known habitat. *A. bifasciatus* came from Japan and from several parts of Europe. The biology of the two species varies greatly, *S. kuvanae* having several generations and hibernating as an adult, while *A. bifasciatus* has but one generation and hibernates as a full fed larva within the egg of the gipsy moth. Both species are

slow spreading parasites, and considerable colonisation work remains to be done before they will have the same distribution as the gipsy moth in the north-eastern States. *A. bifasciatus* was established by liberating the imported parasites, and its colonisation has been continued each year by collecting its host's eggs in New England and separating the parasitised eggs from those containing gipsy moth larvae. A total of 54,345,193 *A. bifasciatus* has been colonised.

S. kuvanae was established by breeding a relatively few adults received from Japan through several generations until sufficient adults of the parasite were obtained to warrant making liberations. It has been colonised in each succeeding year by breeding it through several generations at the laboratory, after having obtained the breeding stock from gipsy moth eggs collected in New England. A total of 20,799,537 adult *S. kuvanae* has been colonised.

The data presented in this bulletin show that *A. bifasciatus* is now an important egg parasite of the gipsy moth in the area in which it has been generally colonised in New England. During the most favourable seasons *A. bifasciatus* should be able to parasitise at least 35 per cent. of the gipsy moth eggs over a considerable portion of the infested area. It is an important fact that the parasitism by *A. bifasciatus* of the gipsy moth eggs increases as the egg clusters decrease in size. There is a tendency for the egg clusters of the gipsy moth to decrease in size after years of great abundance. During a year of great abundance of this parasite, when several *A. bifasciatus* females are ovipositing in the eggs, even while the egg cluster is being deposited, the average percentage of parasitism may run considerably higher than has yet been obtained.

S. kuvanae is also proving to be an important parasite of the gipsy moth eggs in the southern part of New England, but apparently it is not able to work to the best advantage in the more severe climates of the northern part of the infested territory. In the southern area during favourable seasons *S. kuvanae* should parasitise from 30 to 40 per cent. of the eggs of the gipsy moth. The fact shown in laboratory experiments that *S. kuvanae* can reproduce readily in the eggs of several species of insects in addition to those of the gipsy moth may at any time add to the value of this introduction.

SHULL (A. F.). **The Life Cycle of *Macrosiphum solanifolii* with special reference to the Genetics of Color.**—*Amer. Nat.*, lix, no. 663, pp. 289–310. Lancaster, Pa., July-August 1925.

Macrosiphum solanifolii occurs in two varieties, pink and green. The several forms belonging to each of these varieties are briefly described. The results obtained from mating males and females of different colours at various times of the year appear to indicate that colour in these Aphids is due to multiple factors. Under natural conditions the pink variety probably descends chiefly, if not wholly, from the green variety each year. The approximate alternation of *M. solanifolii* between the potato and the rose is probably due to the earlier growth of shoots of the rose as compared with the potato and to removal of the insects from the former by rain and wind, and does not indicate any inherent property of the Aphids or of their cycle. Any form of this species may live and reproduce on either of the principal food-plants at any time of the year.

EWING (H. E.). **The Factors of Inheritance and Parentage as affecting the Ratio of Alate to Apterous Individuals in Aphids.**—*Amer. Nat.*, lix, no. 663, pp. 311–326. Lancaster, Pa., July-August 1925.

There is little experimental evidence in regard to the factors that influence the appearance of sexual forms of Aphids. Such as there is indicates that the factors affecting the appearance or percentage of sexual forms are similar to those affecting the ratio of the different forms of agamic individuals. In regard to the factors affecting the ratio of winged to wingless agamic females much experimental evidence has been produced showing that there are several of these and that definite results can be obtained in the laboratory by modifying any one of them. Among the outstanding ones are inheritance, temperature and nutrition, and the relative importance of each of these appears to depend on the conditions imposed by the combination of all other factors. Any one of these three may under certain conditions become the dominant, or even the controlling, factor.

CAMERON (A. E.). **Soil Insects.**—*Science Progress*, xx, no. 77, pp. 92–108. London, July 1925.

This paper reviews the work already done in relation to soil insects and discusses the effect of their presence on soil fertility. It also deals with injurious species and their control by means of agricultural practices, baits, poisons, soil fumigants, insecticides and chemical fertilisers.

Fruit and Vegetable Quarantine of Porto Rico. Notice of Quarantine No. 58.—*U.S. Dept. Agric., Fed. Hortic. Bd.*, 5 pp. Washington, D.C., 27th May 1925.

This Quarantine with the supplemental Rules and Regulations respecting injurious insects, including the West Indian fruit-fly, *Anastrepha fraterculus*, Wied., and the bean pod borer, *Maruca testulalis*, Geyer, in Porto Rico, came into force 1st July 1925.

No raw fruits or vegetables, except for experimental or scientific purposes for the United States Department of Agriculture, may be moved from Porto Rico territory into or through any part of the United States without a certificate of inspection and of freedom from injurious insect infestation, or of possibility of conveying it. All containers of such fruits and vegetables must be marked, and vessels carrying such goods are liable to inspection and disinfection.

HERNÁNDEZ (E.). **Represión del pulgón amarillo de la caña.** [The Control of the Yellow Sugar-cane Aphis.]—*Rev. Agric. Puerto Rico*, xiv, no. 6, pp. 358–360. S. Juan, P.R., June 1925.

The yellow sugar-cane aphis, *Sipha flava*, can be controlled by dusting the canes with nicotine sulphate, which has been found to destroy from 85 per cent. upwards of the Aphids.

PRELL (H.). **Beiträge zur Biologie des grauen Schildlausrüsslers** (*Anthribus nebulosus* **Forst.**). [Contributions to the Biology of *A. nebulosus*.]—*Zeitschr. Forst- u. Jagdw.*, 1925, no. 4. (Abstract in *Anz. Schädlingsk.*, i, no. 6, p. 69. Berlin, 1925.)

The eggs of the nun moth [*Lymantria monacha*] are often found to have been gnawed, chiefly by Neuropterous larvae, *Raphidia* spp., and may perhaps also be destroyed by *Anthribus nebulosus*, Forst., which is known to feed on the eggs of some Coccids. Its larva attacks not only the spruce scale, *Physokermes piceae*, Schr. (*Lecanium racemosum*, Ratz.), but also *Eulecanium* (*Physokermes*) *coryli*, L., on maple, and *Kermes quercus*, L., on oak. The last two Coccids, as well as *Pulvinaria betulae*, Sign., are also attacked by the larva of *A. fasciatus*, Forst.

GASSNER (G.). **Versuche über die Bekämpfung von Apfelsinenschädlingen durch Blausäurebegasungen.** [Experiments in Combating Orange Pests with Hydrocyanic Acid Gas Fumigations.]—*Zeitschr. Pflanzenkrankh.*, xxxv, no. 3–4, pp. 97–111, 6 figs. Stuttgart, 1925.

In experiments with hydrocyanic acid gas against *Lepidosaphes beckii*, Newm. (*Mytilaspis citricola*, Pack.), *L.* (*M.*) *gloveri*, Pack., and *Chrysomphalus dictyospermi*, Mask., infesting *Citrus* in Spain, complete success attended the use of Zyklon. This derivative of hydrocyanic acid gas consists of pounded kieselguhr impregnated with the gas, which it gives off when strewn beneath the trees. It is sold in sealed tins, from which any desired quantity can be taken by means of a special measuring apparatus without leakage of the fumigant.

BÖRNER (C.). **Neue Untersuchungen zur Reblausrassenfrage.** [New Investigations on the Question of Races of *Phylloxera*.]—*Angew. Botanik*, vi, pp. 160–168. 1924. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 3–4, p. 174. Stuttgart, 1925.)

All data on the susceptibility of vines in southern Europe to infestation by *Phylloxera* are unsatisfactory because of the frequency of mixed infestations by *P. vastatrix* and *P. vitifolii* [*R.A.E.*, A, xii, 556; xiii, 63] and because the vines are not of pure strains. On the other hand it is certain that stocks immune [in Germany] from *P. vastatrix* retain this character in southern Europe and other parts of the world.

WOLFF (M.). **Die Massenvermehrung der Forleule.** [The Mass Increase of the Pine Moth.]—*Deutsche Forstztg.*, xxxix, pp. 659–662. 1924.

Merkblatt des Brandenburgischen Waldbesitzerverbandes über die Forleulengefahr. [Notice of the Brandenburg Association of Forest Owners on the Pine Moth Peril.]—*Ibid*, pp. 698–699.

HAUSENDORFF (—). **Zum Frass der Forleule in den norddeutschen Kiefernrevieren.** [On the Feeding of the Pine Moth in North German Pine Woods.]—*Forstl. Zeitschr. Silva*, xii, pp. 257–260. 1924. (Abstract in *Zeitschr. Pflanzenkrankh.*, xxxv, no. 3–4, pp. 179–180. Stuttgart, 1925.)

According to Dr. Wolff the rainy summer of 1924 encouraged the fungus, *Entomophthora aulicae*, and Hymenopterous and other enemies

also helped materially in checking the pine moth [*Panolis flammea*]. Pines near ant colonies are not attacked.

Remedies suggested are spraying in July with a mixture of copper sulphate and Uspulun, or with a 2 per cent. solution of barium chloride. Trees may recover even after being defoliated twice.

Hausendorff recommends spraying with Bordeaux mixture in June.

FRIEDERICHS (K.). **Ein neuer, vervollkommneter Apparat zur Bekämpfung von Käfern am Raps.** [A new, perfected Apparatus for Combating Beetles on Rape.]—*Anz. Schädlingsk.*, i, no. 7, pp. 73–75, 2 figs. Berlin, 1925.

The author has perfected an apparatus for catching beetles infesting rape, and experiments with a model seem to indicate complete success with a full-size machine. Such a machine would consist of two high wheels about 9 feet apart between which, parallel to their axle, there is a cylinder of wire netting, which is caused to rotate by the motion of the wheels and the height of which from the ground can be adjusted. Numerous strings are attached to the netting, and when the machine is pushed by a horse harnessed at the back, the rotation of the roll causes the strings to flick the beetles off the plants on to a tar-smeared shield behind the roll and extending half-way under it.

ESCHERICH (K.). **Schäden durch die Eichenrindenminiermotte** (*Gracilaria simploniella*, **F.R.**) **in Ungarn.** [Injury done in Hungary by the Oak Bark Mining Moth, *G. simploniella*.]—*Anz. Schädlingsk.*, i, no. 7, pp. 78–79, 1 fig. Berlin, 1925.

Infestation of oaks by *Gracilaria simploniella*, F. R., is reported from Hungary, especially in the case of a plantation of 4-year-old trees cut down to the ground and producing many young shoots from the stumps. The Turkey oak (*Quercus cerris*) was the species chiefly affected, but *Q. sessiliflora*, *Q. pedunculata*, and hornbeam were also attacked. The caterpillars mine the bark, usually just above the ground, and rarely above about 3 ft. The gallery meanders on one side of the twig or stem in regular convolutions, and is enlarged at the end.

ESCHERICH (K.). **Neues über die Kiefernnadelscheidengallmücke,** *Thecodiplosis* (*Cecidomyia*) *brachyntera*, **Schwaegr.** [New Information on the Pine-Needle-Sheath Midge, *T. brachyntera*.] —*Anz. Schädlingsk.*, i, no. 7, pp. 80–81, 1 fig. Berlin, 1925.

Observations made in Czechoslovakia by Gradojevic on *Thecodiplosis brachyntera*, Schwgr., which are to be published in full, are here noticed as supplementing Eckstein's work on this Cecidomyiid [*R.A.E.*, A, xiii, 317].

The eggs, not only singly but in groups up to 6 and more, are laid on the undeveloped May shoots of pine under the yellow cover-scales, between and on the bases of the needle buds. The larva hatches in 3–4 days and slowly pushes its way between the developing needles into the leaf-sheath. The gall is due exclusively to the larva. Usually one larva is found in a gall, but up to 4 have been noticed. The larva hibernates, usually in a cocoon spun on the needles at the tip of the shoot, but also among fallen needles. Hibernation in the galls is rare.

Pupation occurs in spring, and larvae that have hibernated in the galls leave them in spring and fall to the ground, where they pupate without making a cocoon. Natural enemies include *Microcyclops pini*, Kieff., which occurs in enormous numbers and exercises a considerable degree of natural control, spiders, Nematodes and a plant, *Cerastium semidecandrum*, the stem of which is covered with viscous hairs that catch the midges in large numbers. *Ceraphron brachynteri*, Schwgr., was not observed.

Stummer (—). **Die Reblausbekämpfung in der tschechoslowakischen Republik.** [*Phylloxera* Control in Czechoslovakia.]—*Anz. Schädlingsk.*, i, no. 7, pp. 81–82. Berlin, 1925.

This is a brief note on grafting on American stocks, the injection of carbon bisulphide into the soil, and the planting of vines on sandy soils against *Phylloxera* in Czechoslovakia.

Zürcher (L.). **Beobachtungen über die durch die Sommerbrut der Getreidehalmfliege** (*Chlorops taeniopus* **Meig.**) **verursachten Beschädigungen.** [Observations on the Injuries due to the Summer Brood of *C. taeniopus*.]—*Schweiz. Ent. Anz.*, iv, no. 7–8, pp. 51–54. Zürich, 19th July 1925.

The larva of *Chlorops taeniopus*, Mg., bores downwards in cereals from the base of the ear. The longitudinal growth of the stem is interfered with and the ear becomes sterile or only ripens a few grains, remaining more or less completely inside the leaf-sheath. Pupation takes place at the end of June or early in July, and the adult appears at the end of July or early in August. The commonest parasites of this fly are *Pteromalus micans*, Oliv., and *Coelenius niger*, Nees.

Del Guercio (G.). **Il Pidocchio lanigero del Melo ed il suo nemico endofago, *Aphelinus mali* Hald. var. *italica* Del Guercio.** [The Woolly Apple Aphis and its endophagous Enemy, *A. mali*.]—*L'Agric. colon.*, xix, nos. 3–7, pp. 98–104, 121–128, 179–183, 218–225, 254–264, 3 pls., 1 fig. Florence, March-July 1925.

This paper has already been noticed from another source [*R.A.E.*, A, xiii, 294].

Schmidt (M.). **Die Maikäfer in Deutschland. Mitteilungen über Flugjahre und Entwicklungsdauer.** [Cockchafers in Germany. Communications on the Flight Years and Duration of Development.]—*Arb. Biol. Reichsanst. Land- u. Forstwirtschaft*, xiv, no. 1, pp. 1–76, 1 map. Berlin, P. Parey; J. Springer, 1925.

Melolontha melolontha has a four-year development cycle in northern and central Germany, and a three-year one in the regions of the Rhine, Main, Neckar and other parts of south-west Germany. *M. hippocastani* has a five-year cycle in eastern Germany, with a four-year one elsewhere. In both species, flight-periods occur at different times, and areas adjoining one another often have quite different flight-years. Flights therefore occur in Germany every year, in one part or other of the

country. The variations in development depend on the climate of the different areas, and the same conditions do not operate similarly on both species. *M. hippocastani* seems more adaptable to different climatic conditions. As a rule, however, development depends on the average annual temperature. The author is inclined to agree with Decoppet [*R.A.E.*, A, ix, 94] that flight-years occur too regularly to permit of marked variations in the length of the developmental period and that the action of climate on such length can only be an indirect one, being due to its effect on vegetation.

MORSTATT (H.). **Bibliographie der Pflanzenschutzliteratur. Das Jahr 1924.** [A Bibliography of Plant Protection Literature in 1924.]—*Biol. Reichsanst. Land- u. Forstwirtschaft,* iv+226 pp. Berlin, P. Parey ; J. Springer, 1925.

The contents of this volume are indicated by its title. Previous issues have been noticed [*R.A.E.*, A, ix, 445 ; x, 264, 540 ; xi, 373 ; xii, 343].

KRAUSSE (A.). **Ueber die Rammelkammer des grossen Waldgärtners.** [On the Mating Chamber of *Myelophilus piniperda.*]—*Ent. Blätter,* xxi, no. 2, pp. 77–78, 1 fig. Berlin, 30th June 1925.

Further observations are given on the mating chamber of the larger pine beetle, *Myelophilus* (*Blastophagus*) *piniperda*, L. [*R.A.E.*, A, x, 410].

HELLÉN (W.). **Nya fynd av coccider i Finland.** [New Records of Coccids in Finland.]—*Medd. Soc. Fauna et Flora Fennica,* xlix (1922–1923), pp. 4–6. Helsingfors, 1925.

The following Coccids are recorded from Finland for the first time : *Pulvinaria vitis*, L., *Orthezia urticae*, L., *O. cataphracta*, Shaw, *Saissetia oleae*, Bern., and *Pseudococcus adonidum*, L.

ULTÉE (A. J.). **Verslag over de werkzaamheden van het Proefstation Malang in het jaar 1924.** [Report of the Malang Experiment Station for 1924.]—*Meded. Proefst. Malang,* no. 52, 43 pp. Soerabaya, 1925.

The Tephrosia beetle [*Araecerus* sp. ?—see *R.A.E.*, A, vi, 2] attacked *Tephrosia candida* so severely that difficulty was experienced in collecting seed from it. The caterpillars of *Hyposidra talaca* feed on the leaves of *Mimosa invisa*, but the injury is insignificant owing to control by Hymenopterous parasites.

The coffee-berry borer [*Stephanoderes hampei*] was the principal coffee pest in 1924, although the year was not one of severe infestation. The parasite imported from Uganda [*Prorops nasuta*] [*R.A.E.*, A, xii, 200] appears to have established itself in Java, as specimens have been caught on many estates. Coccids, particularly *Pseudococcus crotonis*, did much harm to coffee. Green manure plants susceptible to infestation by this mealybug, such as *Tephrosia candida* and lamtoro [*Leucaena glauca*], should be replaced by immune ones.

Principales Insectos que dañan las Hortalizas. [The Chief Insect Pests of Vegetables.]—*Minist. Agric., Argentina,* Circ. 461, 28 pp., 12 figs. Buenos Aires, 10th June 1925.

The more important pests of vegetables in Argentina and the measures against them are discussed.

Celery is attacked by an Aphid, *Cavariella capreae,* F. Cabbage pests include the caterpillars of *Tatochila autodice,* Hb., and *Plutella maculipennis,* Curt., the larva of a Halticid, *Caeporis stigmula,* Germ., the bug, *Nezara viridula,* L., and the Aphids, *Brevicoryne brassicae,* L., and *Aphis pseudobrassicae,* Davis. Maize is infested by the caterpillars of *Heliothis obsoleta,* F., and *Diatraea saccharalis,* F. Melons, cucumbers and other Cucurbitaceae are attacked by *Solanophila paenulata,* Germ., and *Diabrotica speciosa,* Germ., the bugs, *Anasa guttifera,* Berg, and *Acanonicus hahni,* Stål, the caterpillars of *Diaphania hyalinata,* L., and *D. nitidalis,* Stoll, and the Aphid, *Aphis gossypii,* Glov. Pea pests are a bug, *Gargaphia subpilosa,* Berg., and the Bruchid, *Bruchus pisorum,* L. Pests of Solanaceous plants such as potato and tomato include the tomato bug, *Phthia picta,* Dru., the tomato weevil, *Phyrdenus muriceus,* Germ., the tobacco beetle, *Epitrix parvula,* L., and the onion thrips, *Thrips tabaci,* Lind.

General pests of vegetables are the Nematode, *Heterodera radicicola,* Greef., a beetle, *Epicauta adspersa,* Klug, an ant, *Acromyrmex lundi,* Guér., and various caterpillars.

Miège (E.). **Action du Paradichlorobenzène sur les parasites et sur la faculté germinative des grains de céréales.**—*C.R. Acad. Agric. France,* xi, no. 24, pp. 683–686. Paris, 1925.

Preliminary tests with paradichlorobenzene for the destruction of insect pests show that even the strongest doses do not affect the germinating properties of grain and that quite weak ones (5 grammes to 1 cm.) will kill insects in three hours.

[Printz (Ya. I.).] **Принц (Я. И.). Результаты наблюдений и опытов борьбы с** *Heliothis armigera* **(хлопковой совкой) в Ганджинском районе за 1924 г.** [Results of Observations and Experiments in the Control of *H. obsoleta,* F., in the Gandzhinsk Region in 1924.]—**Материалы 1-го закавказс. совещания при Закхлопкоме по вопросам изучения Вредителей и болезней хлопчатника и организации борьбы с ними.** [*Materials 1st Transcauc. Conf. Study Pests and Diseases of Cotton and Organis. Remed. Measures*], separate, 12 pp. Tiflis, 17–24th November 1924.

These experiments further demonstrate the value of maize as a trap crop for the control of *Heliothis obsoleta,* F., in Transcaucasia [*R.A.E.,* A, xiii, 307]. Attention is drawn to the importance of studying the local life-history of this moth (so as correctly to time the planting of the trap crop) and also to the value of dusting, as compared with spraying, in its control on cotton.

[Traut (I. I.).] **Траут (И. И.) Очередные Задачи по Борьбе с Массовыми Вредителями и болезнями растений в Среднем и Нижнем Поволжьи в 1925 г.** [Routine Work in the Control of Pests and Diseases of Plants in the Central and Lower Volga Region in 1925.]—**Наш Край** [*Our Region*], 1925, no. 3, separate 7 pp. Astrakhan, 1925.

The extent of the locust invasion of this region and the organisation of control measures are very briefly reviewed.

[Shembel (S. Yu.).] **Шембель (С. Ю.). О положении Дела Борьбы с Вредителями в Астраханской Губернии с 1911 по 1924 г.** [The Status of Work for the Control of Pests in the Astrakhan Government from 1911 to 1924.]—**Наш Край** [*Our Region*], 1925, no. 3, separate 17 pp. Astrakhan, 1925.

The more important pests occurring in Astrakhan from 1911 to 1924 and the organisation of work for their control are briefly reviewed. The information concerning the later years has already been noticed from various annual reports.

[Ilinski (A. M.).] **Ильинский (А. М.). Борьба с массовыми Вредителями Сельского Хозяйства в Астраханской Губернии в 1924 году.** [Large Scale Control of Agricultural Pests in the Astrakhan Government in 1924.]—**Наш Край** [*Our Region*], 1925, no. 4, separate 20 pp. Astrakhan 1925.

The work of the entomological department was chiefly directed against *Locusta migratoria*, and the organisation of it is discussed.

[Doinikov (A. V.).] **Дойников (А. В.). Вредители Сельского Хозяйства в Калмыцкой Области и Борьба с ними.** [Agricultural Pests in the Kalmyck Region and their Control.]—**Калмыцкая Область** [*Kalmyck Region*], 1925, no. 2, separate 11 pp. Astrakhan, 1925.

Locusts are the most important insect enemies of agriculture in the Kalmyck region, and most of the work of the regional station has been directed towards their control.

Other insect pests of economic importance are *Cydia pomonella*, *Hyponomeuta malinellus*, *Anthonomus pomorum*, *Zeuzera pyrina*, *Aphis brassicae*, *Plutella maculipennis*, *Pieris rapae*, *Epicauta* spp., *Mylabris* spp., *Phyllotreta* spp., *Aphis gossypii*, *Anisoplia* sp., and *Arctia* (*Palparctia*) *spectabilis*.

[Doinikov (A.), Serov (V. A.), Shembel (S. Yu. & A. A.) & Ilinski (A. M.).] **Дойников (А.), Серов (В. А.), Шембель (С. Ю. и А. А.) и Ильинский (А. М.).** [Insect pests and their Control.]—**Астраханск. Станц. Защиты Раст. от Вредит.** [*Astrakhan Sta. Plant Protect. Pests*], Leaflets nos. 21, 38–42, 44–45, & 53, each 4 pp. (no. 41, 8 pp.), 4 figs. Astrakhan, February–June 1925.

A popular account is given of the habits and control of the following insect pests: *Brevicoryne brassicae*, L., *Hyponomeuta malinellus*, Z., *Locusta migratoria*, L., *Gryllotalpa gryllotalpa*, L., *Cydia pomonella*, L., *Eriocampoides limacina*, Retz., and *Tetranychus telarius*, L. Leaflets 39 and 40 contain instructions for the preparation of Paris green and Bordeaux mixture respectively.

[Baranov (N.).] **Баранов (Н.). Подаци за нову класификациіу** Acridodea. [A Contribution to a New Classification of Acridodea.]—**Пољопривредна Огледна и Контролна Станица, Топчидер фитопатолошки-Ентомолошки Одсек.** [*Agric. Expt. Sta. Topchider*], no. 3, 28 pp., 2 pls. Belgrade, 1925.

As the result of a study of the male genitalia in some Serbian Orthoptera, the author proposes some important alterations in the existing classification of the group.

A non-gregarious form of the Moroccan locust, *Dociostaurus maroccanus degeneratus*, is described from Montenegro; this differs from the swarming one in some external characters, as well as in details of structure of the male genitalia. A non-gregarious form of the Italian locust, *Calliptamus italicus anachoretus*, is also described from near Belgrade. It is characterised only by some modifications in the male genitalia, the external characters not being mentioned.

Ruszkowski (J.). **Smietka cwiklanka** (*Pegomyia hyoscyami* **Panz.**, *Anthomyia conformis* **Fall.**) **jako szkodnik plantacyj buraczanych oraz sposoby jej zwalczania.** [*P. hyoscyami*, Panz. and its Control.]—*Poradnika Gospodarskiego*, separate 8 pp., 5 figs. Posen, 1925.

The life-history of *Pegomyia hyoscyami*, Panz., in Poland is described, and recommendations are made for its control.

[Frenkel (K. L.).] **Френкель (К. Л.). Капустная муха.** [The Cabbage Fly.]—**Иркутск. Станц. Защиты Раст. от Вредит.** [*Irkutsk Sta. Protect. Plants Pests*], 8 pp. Irkutsk, n.d.

A popular account is given of the life-history and control of the cabbage fly [*Phorbia brassicae*, Bch.] in Irkutsk.

[Znamenski (A. V.).] **Знаменский (А. В.). Гессенская муха и меры борьбы с ней.** [The Hessian Fly and its Control.]—**Полтавск. Сел.-Хоз. Опытная Станц., Энт. Отд.** [*Poltava Agric. Expt. Sta., Ent. Dept.*], Bull. 5, 16 pp., 8 figs. Poltava, 1925.

A detailed popular account is given of the life-history, habits and control of the Hessian fly [*Mayetiola destructor*, Say], including a map illustrating the best dates for sowing in the various districts of European Russia.

[Lutchnik (V.), Grinev (G.) & Shmidt (V.).] **Лучник (В.), Гринев (Г.) и Шмидт (В.).** [Insect Pests and their Control.]—**Ставропольск. Станц. Защиты Раст. от Вредит.** [*Stavropol Sta. Protect. Plants from Pests*], Leaflets nos. 1–5, 7–11, 13, 15–18. 9 figs. Stavropol, 1925.

Methods of collecting agricultural pests and the preparation of various spraying materials are dealt with in the first two leaflets respectively. The others contain brief and popular accounts of the habits and control of the following pests: *Anisoplia austriaca major*, Rttr.,

A. cyathigera, Scop., *A. segetum*, Herbst, *A. zwicki*, Fisch., and *A. deserticola*, Fisch.; *Mayetiola destructor*, Say; *Anthonomus pomorum*, L.; *Calandra granaria*, L.; *Bytiscus betulae*, L.; *Brevicoryne brassicae*, L.; *Gryllotalpa gryllotalpa*, L.; *Porthetria* (*Lymantria*) *dispar*, L.; *Hyponomeuta malinellus*, Z.; *Zabrus tenebroides*, Goeze; *Tinea granella*, L.; *Lepidosaphes ulmi*, Fern.; *Nygmia phaeorrhoea*, Don.; and *Rhynchites auratus*, L.

The Insect Menace.—*Indian Med. Gaz.*, lx, no. 6, pp. 276–282. Calcutta, June 1925.

In connection with the Indian Science Congress held at Benares, a joint meeting was held of the Medical Research, Agricultural, Zoological and Botanical Societies, and a combined discussion took place on the subject of insects and their relation to diseases in man, animals and plants. The text or an abstract of the speeches at the discussion are given.

Mr. T. B. Fletcher discussed the importance of entomology in India and gave a rough idea of the enormous losses sustained annually (at least 10 per cent. in the case of agriculture) as a result of insect depredations either to crops, etc., directly or owing to insect-borne diseases of domestic animals and man. He called attention to the importance and economy of organising a central entomological institute with an efficient staff to deal with both pure and applied problems.

Mr. E. A. Andrews gave a general account of observations in connection with the study of the insect pests of tea and pointed out the wide range of such studies; these must include environmental factors and the reactions between the insect and the plant on one side and the plant and the soil on the other.

Mr. P. B. Richards cited instances of insect vectors transmitting plant diseases. He considered that Mr. T. B. Fletcher's estimate of loss was probably too low even for direct damage since, in the United Provinces, the loss of cotton crop from pink boll worm [*Platyedra gossypiella*, Saund.] alone appeared to be over 25 per cent. With regard to remedial measures in India he considered that even where they are sound economically their application is limited by the ignorance of natural history, prejudice and, not least, the poverty of the cultivator.

Mr. A. Howard related many examples suggesting that the attacks of insect pests follow mistakes in the choice of varieties and in agricultural treatment, and that the appearance of a pest may merely show that the wrong variety is being grown, or that the crop is being grown in the wrong way.

Howard (L. O.). **The Needs of the World as to Entomology.**—*Ann. Ent. Soc. America*, xviii, no. 1, pp. 1–21. Columbus, Ohio, March 1925.

The scope of this valuable paper cannot properly be indicated in an abstract, and it should be consulted in the original by those interested. The growing importance of entomology and the increasing need for more men fully trained in its various phases are discussed. Recent important work is reviewed, and the lines of future study are indicated. The increasing collaboration between economic and systematic entomologists and between entomologists and chemists is emphasised.

Wehrle (L. P.) & Welch (P. S.). **The Occurrence of Mites in the Tracheal System of certain Orthoptera.**—*Ann. Ent. Soc. America*, xviii, no. 1, pp. 35–44. Columbus, Ohio, March 1925.

The following is taken from the authors' summary :—

A Tarsonemid mite representing a new genus and a new species (since described as *Locustacarus trachealis*, Ewing [*R.A.E.*, A, xii, 236]) has been found normally to inhabit the tracheal system of the grasshoppers, *Hippiscus apiculatus*, Harris, and *Arphia carinata*, Scud. Only adult females were found to be infested. Structurally this mite resembles the species that causes the Isle of Wight disease in bees. Both mites and eggs may occur in the principal tracheae and the air sacs of the head, thorax, and the first six abdominal segments, the thorax and first three abdominal segments being chiefly involved. Infestation may be so severe that certain air sacs and tracheae are almost or completely obstructed. All stages may be found in the same host. The method of infestation is unknown. Possibly the mites enter through the large spiracles of the thorax or abdomen or both.

Duboscq (O.) & Grassé (P.). **Notes sur les protistes parasites des Termites de France. Appareil de Golgi, mitochondries et vésicules sous-flagellaires de** *Pyrsonympha vertens* **Leidy.**—*C.R. Soc. Biol.*, xciii, no. 24, pp. 345–348, 7 figs. Paris, 10th July 1925.

This is an account of *Pyrsonympha vertens* (*Dynenympha gracilis*), a protozoon infesting *Reticulitermes* in France.

Le Marchand (S.). **Note sur la présence en France de** *Gracilaria zachrysa* **Meyrick, microlépidoptère exotique, nuisible aux Azalées.**—*Bull. Soc. ent. France*, 1925, no. 9, pp. 146–150. Paris, 1925.

Gracilaria zachrysa, Meyr., originally probably exported from Japan, has now been found in various districts of France on *Azalea indica*, both in greenhouses and in the open. This moth was probably introduced from Belgium, and is apparently very adaptable to varying climatic conditions. The larval and pupal stages are both of about 50 days' duration. The injury caused by the mining of the larvae is described.

Voukassovitch (P.). **Observations biologiques sur quelques insectes prédateurs des Pucerons et leurs parasites et hyperparasites.**—*Bull. Soc. ent. France*, 1925, no. 10, pp. 170–172. Paris, 1925.

In Serbia the larvae of *Coccinella septempunctata* and *Chrysopa vulgaris* are the more important predators attacking the rose Aphids, *Macrosiphum rosae* and *Myzus rosarum*. Larvae of the following Syrphids were also abundant in 1924 :—*Paragus quadrifasciatus*, Meig., *Syrphus balteatus*, DeG., *S. vitripennis*, Meig., *S. pyrastri*, L., and *Melanostoma mellinum*, L. The last-named was particularly abundant on cabbage leaves attacked by *Brevicoryne* (*Aphis*) *brassicae*; this species pupates on the leaves, whereas the others leave the plant before pupation. These Syrphids were parasitised by the Chalcid, *Encyrtus aeruginosus*, Dalm., and the Ichneumonids *Promethes pulchellus*, Holmgr., *Homotropus tarsatorius*, Panz., and *Bassus laetatorius*, F., the

last-named being the most abundant. The Ichneumonids are parasitised by a species of *Pachyneuron* that lays its eggs on their larvae within the puparium of the Syrphid. It may also be a primary parasite of the Syrphid pupa, but this is of very rare occurrence.

POUTIERS (R.). **Traitements contre le pou rouge** (*Chrysomphalus dictyospermi*) **et autres cochenilles à carapace.**—*Progr. agric. & vitic.*, lxxxiv, no. 28, pp. 42–44. Montpellier, 12th July 1925.

Further experiments have shown the oil emulsion previously described [*R.A.E.*, A, xiii, 296] to be effective against *Chrysomphalus dictyospermi* as well as other Coccids. Though excellent results were obtained by winter treatment between February and April, applications may be made at any time of the year and are of most value against the young scales at the beginning of a new generation.

DIFFLOTH (P.). **La lutte contre les maladies des arbres fruitiers.**—*Vie agric. & rur.*, xxvii, no. 29, pp. 33–38, 4 figs. Paris, 18th July 1925.

A number of formulae are given for the usual sprays recommended against the pests of fruit trees in France, with instructions for their use.

SITOWSKI (L.). **Do biologji pasorzytów borecznika** (*Lophyrus* **Latr.).**—*Roczniki Nauk Rolniczych i Lesnych*, xiv, separate, 25 pp., 3 pls., 5 figs. Posen, 1925. (With a Summary in German.)

Of the various species of *Diprion* (*Lophyrus*) occurring in Poland *D. pini*, L., and *D. sertifer*, Geoffr., are the more serious pests in pine forests. The development and biology of the latter sawfly is described in detail. Parthenogenesis is a fairly common occurrence, the unfertilised eggs always producing males. The life-cycle generally lasts a year, though occasionally the winter may be spent by the larvae in the cocoon, and the adults then emerge in the following spring. In this case they are mostly males.

The complicated relations between the Dipterous and Hymenopterous parasites of the various species of *Diprion* are discussed. One of the most common Tachinids is *Sturmia inconspicua*, Meig., the anatomy and biology of which is described. It is attacked by *Hemipenthes morio*, L., and *Argyramoeba varia*, F. Another Tachinid parasite, *Ceromasia inclusa*, Htg., is itself parasitised by *Mesochorus fulgurans*, Curt., which has previously been erroneously described as a primary parasite of *Diprion*. From these and previous observations the author concludes that the members of the genus *Mesochorus* are exclusively secondary parasites. The more important Ichneumonid is *Exenterus marginatorius*, F., a fairly common parasite of *D. pini*, *D. frutetorum*, F., and *D. sertifer*. Another parasite of *D. sertifer* is *Lophyroplectus luteator*, Thunb., of which the biology, larvae and metamorphosis are described. Other parasites of *Diprion* are *Torocampus eques*, Htg.; *Lamachus lophyrorum*, Htg.; *L. frutetorum*, Htg.; *Microcryptus basisonius*, Grav., and *M. sericans*, Grav. (both parasitised by *Holocremnus cothurnatus*, Holmgr.); *M. contractus*, Grav. (parasitised by *H. ratzeburgi*, Tschek.); *Microplectron fuscipennis*, Thoms.; *Zemiophorus scutellatus*, Htg.; *Exetastes laevigator*, Vill.; *Campoplex adjunctus*, Först.; *C. stragifex*, Först.; *Ophion obscurus*, F.; *Ctenopelma xanthostigma*, Holmgr.; *Stylocryptus profligator*, F.;

Ichneumon fabricator, F.; and *Pimpla pfankuchi*, Brauns. The Pentatomid bugs, *Eurydema oleraceum*, L., *E. festivum* var. *decoratum*, H. S., and *Chlorochloa juniperina*, L., destroy the eggs of these sawflies.

The author considers that with the exception of those species of *Diprion* (*Lophyrus*) that occur in great abundance, the majority of the members of this genus are of considerable value in pine forests, as they serve as hosts for numerous Tachinid and Ichneumonid parasites that are important enemies of other forest pests.

[Dyshler (F. M.).] **Дышлер (Ф. М.) Обзор борьбы с массовыми вредителями на Украине в 1924 г.** [A Review of Campaigns against Pests in the Ukraine in 1924.]—*Protection of Plants in Ukraine*, 1925, pt. 1–2, pp. 3–7. Kharkov, March 1925.

The agricultural pests, including insects, recorded during 1924 in the Ukraine and the work organised for their control are briefly reviewed.

[Kamyshnyi (N. S.).] **Камышный (Н. С.). Вредители леса и борьба с ними в Харьковской губ. в 1924.** [Forest Pests and their Control in the Kharkov Government in 1924.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 14–16. Kharkov, March 1925.

This list has been compiled from the official annual report of the forestry division for 1923–24 and the author's personal observations. *Dendrolimus* (*Gastropacha*) *pini*, L., was found in pine stands of trees from 35 to 100 years old; *Pissodes notatus*, L., damaged pine trees up to 20 years old; *Diprion* (*Lophyrus*) *pini*, L., was less abundant than usual apparently owing to natural enemies; *Porthetria* (*Ocneria*) *dispar*, L., though not abundant, was widely distributed, and its numbers are apparently gradually increasing; *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, auct.) was widespread throughout orchards and oak forests, the infestations in the latter arising mainly from the presence of wild pear and apple trees; *Gryllotalpa gryllotalpa*, L. (*vulgaris*, Latr.), was injurious in all low-lying nurseries; *Scolytus scolytus*, F., and *Hylesinus fraxini*, F., caused important injury to ash and lime trees; the bark-beetles infesting conifers were *Ips sexdentatus*, Boern., *I. acuminatus*, Gyll., *I. proximus*, Eich., *Myelophilus piniperda*, L., and *M. minor*, Hart.

[Rakhmaninov (A. N.).] **Рахманинов (А. Н.). О работе Энтомолог. Отдела Х.О.С.Х.О.С.** [On the Work of the Entomological Department of the Kharkov Experiment Station.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 37–40. Kharkov, March 1925.

A brief review is given of the activities of the entomological department of the Kharkov experiment station; the various projects planned include studies of *Cephus pygmaeus*, L., and the frit fly [*Oscinella frit*, L.].

[Znamenski (A. V.).] **Знаменский (А. В.). О мерах борьбы с гессенской мухой.** [The Control of the Hessian Fly.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 41–51, 1 map. Kharkov, March 1925.

The remedial measures recommended in Russia and elsewhere for the control of the Hessian fly [*Mayetiola destructor*, Say] are reviewed.

From experiments carried out in various districts of European Russia a system has been evolved by which the fly-free date for sowing in any particular locality may be arrived at. The variation in the different districts is shown on a map. Points of importance are :—sowing at the right time, the selection of resistant varieties of seed, and the application of agricultural measures that improve the growth of the crop.

[Kolobova (A. N.).] **Колобова (А. Н.) Некоторые виды чернотелок (Tenebrionidae) как вредители пшеницы, кукурузы, свеклы и бахчевых растений.** [Some Species of Tenebrionids as Pests of Wheat, Maize, Beet and Vegetable Crops.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 52–57, 5 figs. Kharkov, March 1925.

Keys are given to the larvae and pupae of the Tenebrionids, *Blaps halophila*, Fisch., *Opatrum sabulosum*. L., and *Pedinus femoralis*, L. The last named is one of the most injurious species, though it is frequently overlooked. During the spring of 1924 it caused considerable injury to sugar-beet in the Ukraine. Both this species and *O. sabulosum* have been previously recorded from tobacco and maize in Bessarabia. *B. halophila* attacked various crops during 1923 and 1924, including winter-sown wheat, sugar-beet and maize.

The larvae of these beetles are easily mistaken for wireworms, to which the injury done has often been attributed. The winter is passed in the adult and larval stages ; the latter are the most injurious to beet in the spring, and the insects do not pupate until May or June (about a year after hatching). Larvae hatching in July will pupate the following July. The pupal stage lasts from 15 to 16 days. Adults emerging in July begin laying eggs before entering hibernation.

The eggs of *B. halophila* are laid in the spring in the soil ; they hatch in from 10 to 11 days. The larvae feed on the seed, and will also attack the young stems underground. Maize, beet, melons and cucumbers are attacked in the spring and wheat in the autumn. In the absence of other food the larvae feed on weeds. They are able to withstand long periods of starvation.

The remedial measures suggested are crop rotation, clean cultivation and hand collection of adults. During the day, the beetles generally hide under any available rubbish in the field. The larvae may be poisoned by wetting the seed slightly with water and flour and then dusting with Paris green.

[Dekhtiarev (N. S.).] **Дехтярев (Н. О.). О новом паразите итальянской саранчи.** [A New Parasite of the Italian Locust.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 60–62, 2 figs. Kharkov, March 1925.

The parasite described was found amongst the eggs of *Calliptamus* (*Caloptenus*) *italicus*, L., in company with *Epicauta erythrocephala*, Pall., and *Mylabris* sp. It is thought to be a Carabid larva. It was more numerous than either of the other parasites, but its distribution was very local. The adult was not reared. Hibernation presumably occurs in the larval stage.

[Averin (V. G.).] **Аверин (В. Г.). «Волны жизни» важнейших вредителей с.-х. Украины.** [The Periodical Incidence of the more important Pests of Agriculture in the Ukraine.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 62–63, 1 graph. Kharkov, March 1925.

A graph is given showing the fluctuations in the occurrence of the more important insect pests of agricultural crops in the Ukraine from 1910 to 1925.

[Averin (V. G.).] **Аверин (В. Г.). «Очаги» в распределении вредителей и способ их изображения.** [Foci of the Distribution of Pests and a Method of illustrating them.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 64–68. 3 maps. Kharkov, March 1925.

The spread of *Hyponomeuta malinellus*, Zell., *Nygmia phaeorrhoea*, Don., and *Aporia crataegi*, L., from certain foci of infestation during 1924 in the Ukraine is illustrated on a series of charts.

[Kemarski (P.).] **Кемарский (П.). Энтомологический наблюдательный пункт при Тростянецком Комбинате Сахаротреста.** [Entomological Observation Point of the Trostianetz Sugar Trust.]—*Prot. Plants Ukraine*, 1925, pt. 1–2, pp. 68–70. Kharkov, March 1925.

Owing to the abundance of *Loxostege sticticalis*, L., and *Phytometra* (*Plusia*) *gamma*, L., in beet fields in 1921, experiments against them were organised, and are still in progress. For the control of *L. sticticalis* the best results have so far been obtained with a spray of a 4 per cent. solution of barium chloride. The dispersion of the adults by sulphur fumigation also gave good results provided the sulphur containers were set in parallel lines and lit in turn along the lines. Spraying with various substances was not very effective against *P. gamma*, nor were poison baits very satisfactory. Heaps of beet leaves placed at intervals throughout the field before the winter-sown crop shows above ground is the best means of collecting the larvae.

Uvarov (B. P.). **Grasshoppers (Orthoptera, Acrididae) from the Mount Everest.**—*Ann. & Mag. Nat. Hist.*, xvi, pp. 165–173, 2 figs., 1 pl. London, July 1925.

The solitary phase of the Asiatic Locust (*Locusta migratoria*, L., ph. *danica*, L.) is recorded from an altitude of 14,000–15,000 feet, where it was numerous, though of smaller size than in lower-lying localities. It is suggested that the conditions of its existence in Tibet are not favourable to the appearance of the swarming phase of the species.

Webster (J. F.). [**Report.**]—*Mthly. Agric. Bull., Iraq, 16th May–15th June 1925*, 2 pp. Baghdad, 23rd June 1925.

Cotton has been less extensively sown than usual, and is remarkably free from attack by insects, particularly *Earias insulana* (spotted bollworm). *Platyedra vilella* has been found feeding freely on the growing

shoots and buds of the cotton-plant, its normal food-plant being hollyhock. Trials are being made with specially selected early varieties of cotton in order to test the possibility of sowing this crop after the depredations of locusts have ceased. Egg-laying by locusts was general throughout the period under report, in some areas about a ton of eggs having been laid per acre. The excreta of locusts is apparently poisonous, as a number of deaths occurred among sheep turned on to crops immediately the locusts had passed through them.

UCHIDA (T.). **On two Ichneumonidae parasitic upon** *Pieris rapae* **L.**—*Jl. Sapporo Soc. Agric. & Forestry*, xvi, no. 72, pp. 501–510, June 1925. [Japanese; with a German Summary.]

Theronia japonica, Ashm., is parasitic upon the larvae of *Pieris rapae*, L., *Aporia crataegi*, L., *Clania minuscula*, Butl., *Dendrolimus* spp. and *Malacosoma neustria*, L., var. *testacea*, Motsh.

Pimpla rapae, sp. n., usually oviposits on the third instar larva of *Pieris rapae*, the adult appearing from the pupa of the host about 3 weeks later. Only a single individual emerges from one host. A description of it is given in German.

TAKAHASHI (R.). **Morphological studies on** *Pachytylus migratorioides* **Reich. (Acrididae).**—*Dobutsugaku Zasshi* (*Zool. Mag.*), xxxvii, no. 439, pp. 191–203. Tokyo. May 1925.

In 1923 large numbers of *Locusta* (*Pachytylus*) *migratoria* ph. *migratorioides*, migrated to Formosa from the Philippines, and some of them deposited eggs. Studies were made in detail on the post-embryonic development of the antennae and terminal abdominal structures of the nymphs hatched from these eggs. This locust has five nymphal instars besides the pronymphal stage.

SWENK (M. H.). **The Chinch Bug and its Control.**—*Nebraska Agric. Expt. Sta.*, Circ. 28, 34 pp., 5 figs. Lincoln, Neb., June 1925.

Blissus leucopterus (chinch bug) is one of the most injurious insect pests of cereal crops in the United States. Its years of great abundance and injury occur irregularly in cycles of varying duration, the intervals being controlled largely by the direct or indirect effects of weather conditions on the insects. The sixth serious outbreak in Nebraska is expected in 1925, and in view of this all the essential information and locally applicable means of control have been collected in the present paper. The history of previous outbreaks is described, and the various types of barriers recommended by the U.S. Department of Agriculture are discussed.

GUYTON (T. L.) & CHAMPLAIN (A. B.). **The Oriental Fruit Moth.**—*Pennsylvania Dept. Agric.*, General Bull. 405, 7 pp., 4 figs. Harrisburg, Pa., 1st June 1925.

The life-history of *Cydia* (*Laspeyresia*) *molesta*, Busck (oriental peach moth) as occurring in Pennsylvania is described, and remedial measures are discussed [*R.A.E.*, A, xiii, 253, etc.].

Prettijohn (C. B.) & Murdoch (R.). **The Tea Tortrix Pest.**—*Trop. Agriculturist*, lxiv, no. 6, p. 364. Peradeniya, Ceylon, June 1925.

A sub-committee appointed to enquire into methods of dealing with the tea tortrix [*Homona coffearia*] recommends the collection of egg-masses; the taking of all attacked flush as soon as possible; intensive cultivation to alleviate the after-effects of attack; high shade, best obtained by growing *Albizzia* and dadap [*Erythrina*] and lopping the latter in alternate lines; and various means of encouraging bird life. These measures should be adopted for three years by all estates in the district.

Allen (C. E. F.). **Report of Superintendent of Agriculture and Curator, Botanic Gardens, for the Year ending 30th June, 1923.**—*Commonw. Austral. Northern Territory: Rept. Administ. 1922-23*, pp. 11–14. Melbourne, 1924. [Received 27th July 1925.]

The boll-worm, *Earias huegeli*, has been responsible for at least 50 per cent. of the damage done to cotton bolls at Stapleton. *Platyedra gossypiella* (pink bollworm) has been found in many parts of the country.

Gater (B. A. R.). **Notes on Miscellaneous Insects in 1924.**—*Malayan Agric. Jl.*, xiii, no. 6, pp. 160–167. Kuala Lumpur, June 1925.

Numerous borers were found in a consignment of Brazil nuts [*Bertholletia excelsa*], though all cannot be considered primary pests. They included *Araecerus fasciculatus*, DeG., the Tenebrionid, *Alphitobius laevigatus*, F., and the moths, *Setomorpha rutella*, Zell., *Decadarchis leucopogon*, Meyr., and *Labdia stibogramma*, Meyr. The Gelechiid, *Stegasta variana*, Meyr., was found feeding on the leaves of *B. excelsa* in the field. The Hispids, *Plesispa reichei*, Chap., and *Promecotheca cumingi*, Baly, were found on coconuts in Labuan; the latter damages mature palms, and the larva is a true miner.

The weevils, *Hypomeces squamosus*, F., and *Alcides leeuweni*, Hellr., are the most serious pests of kapok [*Eriodendron anfractuosum*]. The eggs of the latter are laid inside the young green shoots, and hatch in 3 days, the larva feeding for 3 or 4 months. Pupation occurs inside the stem, and this stage lasts from 8 to 12 days, the adults remaining within the stem for a further 4 to 7 days. When numerous, they may cause serious damage by gnawing the tender shoots, but as a rule they appear to attack the weak rather than the vigorous trees. Other kapok pests are a Noctuid, *Beara* sp., and the Lymantriid, *Dasychira mendosa*, Hb. *Cosmophila* (*Anomis*) *flava*, F., a minor pest of cotton, was found damaging roselle [*Hibiscus*]. Bananas were attacked by a Chrysomelid, *Nodostoma* sp. *Amathusia phidippus*, L., usually occurring on coconut, was bred on banana. *Pyrausta salentialis*, Snell., caused considerable damage to maize, and *Cnaphalocrocis medinalis*, Guen., was also found on this crop. Chillies were attacked by *Amsacta lactinea*, Cram., and *Anomala pallida*, F., the latter having also been recorded on tea and derris [*Deguelia*]. The Noctuid, *Amyna punctum*, F., caused considerable damage to croton leaves. Soursop [*Anona muricata*] was commonly attacked by the larvae of *Papilio agamemnon*, L., and *Platyja umminia*, Cram. Dadap (*Erythrina lithosperma*) was severely damaged by *Terastia meticulosalis*, Guen., and *E. indica* was slightly attacked by *Agathodes ostentalis*, Hb. The fruits of

rambutan (*Nephelium lappaceum*) were damaged by *Dichocrocis punctiferalis*, Guen., and the leaves were eaten by the Noctuid, *Ischyja manlia*, Cram. *Dacus cucurbitae*, Coq., was found on cucumbers. The Pyralids, *Crocidolomia binotalis*, Zell., and *Hellula undalis*, F., were the more common pests of cruciferous crops. *Lamprosema indicata*, F., and *Tirathaba rufivena*, Wlk., attacked the foliage of beans. The latter moth has been reared from coconut spathes in Fiji, whereas in Malaya the species on coconut is allied to *T. trichogramma*, Meyr., though not definitely identified. It has been suggested that it may only be a local race of *rufivena*, but differs in both the adult and larval stages.

A list is given of the parasites and predators reared during 1924 showing the host and the stage in which it is attacked.

Philpott (A.). **Australian Lepidoptera in New Zealand.**—*N.Z. Jl. Sci. & Tech.*, vii, no. 6, pp. 364–366. Wellington, May 1925.

An annotated list is given of the Australian Lepidoptera occurring at Nelson during 1924–25; these include *Tortrix postvittana*, Wlk., one of the worst orchard pests, and *Spilonota macropetana*, Meyr., which is fairly common, and may possibly develop into a serious pest of blue gum (*Eucalyptus globulus*). *Herse* (*Sphinx*) *convolvuli*, L. (convolvulus hawk-moth) was very abundant and apparently passes the winter in the larval or pupal stage.

Jepson (F. P.) & Gadd (C. H.). **The Control of the Shot-hole Borer of Tea.**—*Dept. Agric. Ceylon*, Bull. 72, 46 pp., 4 figs. Peradeniya, May 1925.

This is a detailed account of experiments with manures for the control of *Xyleborus fornicatus*, Eichh. [*R.A.E.*, A, xi, 425; xiii, 357].

Ferguson (D. B.). **Fumigation of Citrus Trees.**—*Agric. Gaz. N.S.W.*, xxxvi, pt. 6, pp. 437–444, 7 figs. Sydney, 1st June 1925.

An account is given of the methods adopted in California of fumigating with hydrocyanic acid gas for the control of *Citrus* pests [*cf. R.A.E.*, A, vii, 228; viii, 29, 230; ix, 117; xii, 35, etc.].

Miles (H. W.). **Notes on Tachinid Flies.**—*Trans. Lincolnshire Nat. Union*, 1924, separate 4 pp., 2 pls. [*sine loco*].

During 1923 two Tachinids were reared at Kirton, *Meigenia floralis*, Fall., from the larvae of *Phaedon cochleariae*, F. (mustard beetle), and *Compsilura concinnata*, Mg., from *Cucullia verbasci*, L. (mullein moth). *Compsilura concinnata* is a well known larviparous parasite of Lepidoptera and has also been reared from sawfly larvae. The newly hatched larvae are deposited beneath the skin of the host larva, which is destroyed in about a fortnight. Pupation lasts from 10 to 14 days. There are several broods during the year.

The year 1924 proved particularly favourable to Tachinids, others reared being *Ptychomyia selecta*, Mg., from the larva of *Pteronus ribesii*, Scop., and *Zenillea roseanae*, B.B., from a larva of *Tortrix* on apple.

Cottrell-Dormer (W.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 457–459. Brisbane, 1st June 1925.

In March and April 1925, the grey-back beetle [*Lepidoderma albohirtum*, Waterh.] was more abundant than usual, and the visible damage done by it must be expected to extend during the following month. It is notable that the grubs almost exclusively limited their attack to sugar-cane that was fairly big at the time of the flight of the adults.

Jarvis (E.). **Entomological Hints to Canegrowers.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 459–462, 3 pls. Brisbane, 1st June 1925.

As it is too late to attack the larvae of the grey-back beetle [*Lepidoderma albohirtum*, Waterh.] in May, the pupae may be destroyed by fumigation at any time during July and October.

Small heaps of split sugar-cane (about 18 inches long) should be placed on headlands of low-lying blocks where weevil borers [*Rhabdocnemis obscura*, Boisd.] have been numerous in previous seasons. These heaps should be lightly covered with trash to exclude sunlight and prevent the sticks from drying too quickly, and should be examined every second day.

Jarvis (E.). **On the Vestiture of Cane-beetles.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 463–466, 1 pl. Brisbane, 1st June 1925.

Details are given of the arrangement of scales on the elytra in *Lepidiota* and *Lepidoderma*, and other Coleoptera.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 467–469, 1 pl. Brisbane, 1st June 1925.

In field tests with tar and poisoned kerosene emulsion for the control of *Mastotermes darwiniensis*, Frogg. [*cf. R.A.E.*, A, xiii, 286] it was found that the tar may help to protect sugar-cane sets from the injury resulting from continuous wet conditions, but that the sodium arsenite in the kerosene emulsion apparently kills the buds. *Ceromasia sphenophori*, Vill., has been liberated in various districts for the control of *Rhabdocnemis obscura*, Boisd. *Lepidiota frenchi*, Blackb., is likely to be troublesome during the year to young plant and ratoon cane. A large hitherto unrecorded species of Dexiid fly has been reared from a third-stage larva of this species.

Girault (A. A.). **The Banana Thrips Rust.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 471–517, 1 pl. Brisbane, 1st June 1925.

The insect causing banana rust is *Anaphothrips signipennis*, Bagn. It may be found in company with *Euthrips bilongilineatus*, Gir., in the Gympie district, but the latter species is scarce. A third species was also found, but is still unidentified. These thrips are confined to the fruit and pseudostem of banana plants, the only other plant on which they have been taken being tomato.

A. signipennis may be found in every stage throughout the year. The eggs are laid under the skin of the plant at the site of the colonies. On the stem they are always in dry places under the sheaths or along

the edges of the sheaths and occur from top to bottom without reference to exposure to the sun. On the fruit they invariably occur near the base. They are not laid in the corms. They hatch on the average in about 2 weeks, and the larvae at once crawl a short distance and begin feeding. If given a choice of corm or stem they choose the latter and remain on it. Within 8 days they leave the plant and enter the soil for pupation. On the average the period spent underground is 12·3 days. The nymphs are able to crawl slowly; they have only been found in the soil. The maximum length of the adult life is 112 days and the minimum 27. As regards natural enemies, only a red mite has been seen, attached to both adults and young, but its relation to the thrips is unknown.

As the adults are daily emerging from the soil and the eggs are daily hatching on the stem and fruit, no single treatment can be effective, and it was found that measures are not necessary until February. Most of the materials tested, except pyrethrum, produced indifferent results. Pyrethrum powder should be applied, with an equal quantity of sifted wood-ashes, at nine day intervals beginning when the fruit is opening or somewhat later. At least four treatments should be made. If more are required, the increased cost may be compensated for by adulterating the powder to 25 per cent., but not lower. All tips of the fruit should be removed and destroyed. A strong solution of nicotine sulphate may be used as an alternative insecticide in strong kerosene soap solution. The nymphs should be exposed to the heat of the sun by hoeing.

TURNER (J.). **A Pest of the Silver Wattle.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 519–520, 1 pl. Brisbane, 1st June 1925.

Gracilaria (*Acrocercops*) *plebia*, Turner, has been causing serious injury by defoliating silver wattle (*Acacia podalyriaefolia*) in Sydney. It was originally described from Brisbane, but presumably owing to the activities of natural enemies, has never reached serious proportions there. A search for these parasites and their transfer to Sydney is considered advisable.

Cut Worms and Cabbages.—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 523–524. Brisbane, 1st June 1925.

Considerable injury has been done to cabbage and cauliflower plants in Queensland by *Agrotis radians* and *A. spina*. There are apparently four broods during the period of growth of the plants. The usual remedial measures, including cultivation, poison baits and trapping of the larvae, are recommended.

GHESQUIÈRE (J.). **Travaux entomologiques au Kasai et au Sankuru.**—*Bull. agric. Congo belge*, xvi, no. 1, pp. 263–270. Brussels, March 1925.

A recent survey has again shown that the reports of the existence of *Platyedra gossypiella* in certain districts of the Belgian Congo are erroneous [*R.A.E.*, A, xi, 437]. *Heliothis* [*obsoleta*] occurs, but is not an important pest; *Earias* [*insulana*] is more serious and occurs later in the season. Of the cotton-stainers, *Dysdercus nigrofasciatus* and *D. fasciatus* are the most widely distributed in the district under review. *Sciocoris fuscosparsus* caused certain damage to young

capsules in one locality, its occurrence possibly being due to the proximity of the forest. A list of the various trees serving as food-plants for *Dysdercus* is given, and their destruction is recommended. *Heterodera radicicola* occurs on cotton and many cultivated plants ; its abundance is considered to be a result of the sandy nature of the soil.

A list is also given of the more important pests of other crops, including *Helopeltis bergrothi* on mango, guava and *Aralia*, and *Inesida leprosa* on *Chlorophora excelsa* and mulberry.

DE PEYERIMHOFF (P.). **Les Coléoptères des Euphorbes dans le Maroc méridional. (Deuxième note.)**—*Bull. Soc. Sci. nat. Maroc*, v, no. 1–2, pp. 8–14, 1 fig. Rabat, 31st March 1925.

Since the author's first note [*R.A.E.*, A, xi, 456], further material has been collected, and is here dealt with, including a Histerid, *Platysoma* (*s.str.*) *euphorbiae*, sp.n., in decayed stems of *Euphorbia resinifera*, and the Scolytids, *Triotemnus longicollis*, sp.n., in decayed stems of *E. resinifera* and *E. beaumierana*, and *Aphanarthrum mairei saturatum*, subsp. n., and *Cisurgus occidentalis resiniferae*, subsp. n., in decayed stems of *E. resinifera*.

VOUKASSOVITCH (P.). **Contribution à l'étude des insectes parasites de l'Eudémis** (*Polychrosis botrana* **Schiff.**) **et de la Pyrale de la Vigne** (*Cenophthira pilleriana* **Schiff.**).—*Ann. Epiphyties*, xi, no. 2, pp. 107–124. Paris, March–April 1925. [Received 4th August 1925.]

This account of the parasites of vine moths, *Polychrosis botrana* and *Sparganothis pilleriana*, has been noticed from another source [*R.A.E.*, A, xii, 349].

UGANDA PLANT PEST BOARD. **Assistant Entomologist's Report.**—*Farmers' Jl.*, vii, no. 23, pp. 25–26. Nairobi, 4th June 1925.

Experiments with paradichlorobenzene for the control of *Pseudococcus citri*, Risso (coffee mealy-bug) have been continued, both *Coffea robusta* and *C. arabica* being treated with amounts varying from 1½ to 4 oz. The smaller amount was applied to 3-year-old trees, and though effective in destroying the mealy-bugs, it reacted unfavourably on trees in a weak condition. The applications were made to the exposed roots of the trees, and further experiments are to be made with applications round the collar. *Lycidocoris mimeticus*, R. & P., has been found plentifully on wild *Coffea arabica* growing under forest conditions; it also occurs on *C. excelsa* and *C. robusta*. Trap crops of *Hibiscus cannabinus* and *Sida cordifolia* are being planted between cotton to attract *Oxycarenus* spp., and various species of *Hibiscus* are being planted as trap crops for *Dysdercus* spp.

BALLARD (E.). **Notes on Insects.**—*Madras Agric. Dept. Yearbook 1922*, pp. 27–31. Madras, 1923. [Received 4th August 1925.]

These notes include the following information: The incubation period of *Helopeltis antonii* is 6 days, the eggs are pushed right into the twig [of *Melia azadirachta*] wherever it is soft enough, otherwise they are laid under the bark. Cannibalism is recorded among the nymphs of *Dysdercus cingulatus* found on *Hibiscus esculentus*.

Ballard (E.). **An Enemy of** *Prodenia litura*, **Fb.**—*Madras Agric. Dept. Yearbook 1922*, pp. 31–32, 1 fig. Madras, 1923. [Received 4th August 1925.]

The Pentatomid, *Canthecona furcellata*, Wolff, is recorded as destroying a large number of the larvae of *Prodenia litura*, F., in Madras in 1921.

Ramachandra Rao (Y.). **Life-history of** *Pundaluoya simplicia*— **the Cholam Leaf-hopper.**—*Madras Agric. Dept. Yearbook 1923*, pp. 27–31. Madras, 1924. [Received 4th August 1925.]

The various stages of *Peregrinus maidis*, Ashm. (*Pundaluoya simplicia*, Dist.) are described, with brief notes on its life-history [*R.A.E.*, A, xii, 387]. The eggs hatch in about 8 to 10 days. In small areas the pest may be controlled by spraying with kerosene emulsion, but in large ones treatment is not practicable under Indian conditions.

Ogilvie (L.). **Chief Plant Diseases and Pests observed during the Year.**—*Bermuda: Repts. Bd. & Dept. Agric. 1924*, pp. 36–43. Bermuda, 1925.

Spraying with oil emulsion during the winter is recommended for the control of *Pseudococcus nipae*, Mask., which frequently causes severe injury to the tips of shoots of avocado; less important scales on this tree were *Chrysomphalus dictyospermi*, Morg., and *Pulvinaria pyriformis*, Ckll. A serious disease of bananas is recorded, the insects associated with it being an unidentified Tineid, the Aphid, *Pentalonia nigronervosa*, Coq., the beetles, *Carpophilus dimidiatus*, F., *Sericoderus* sp. and *Atheta coriaria*, Kr., and also *Drosophila* spp. *Xylomyges* (*Prodenia*) *eridania*, Cram., caused extensive damage to many crops and ornamental plants; it breeds during the summer on *Amarantus hybridus* and may be controlled by arsenical sprays. Woodlice, probably *Armadillidium vulgare*, Latr., caused much damage to seedling string beans, but repeated sprayings with 2 lb. lead arsenate powder to 40 gals. water protected the plants till they had outgrown the attack.

Zinckenia (*Hymenia*) *fascialis*, Cram., was prevalent on beet; *Feltia subterranea*, F., and *Prodenia ornithogalli*, Guen., attacked carrots; soft rot is disseminated among celery plants by the Phorid, *Dohrniphora divaricata*, Ald., the plants being rendered more susceptible to the disease by the excessive use of sodium nitrate; *Lygus pratensis*, L., was common in the celery fields; *Peregrinus maidis*, Ashm., occurred on maize; *Phytometra* (*Autographa*) *brassicae*, Riley, attacked cabbage; *Aphis gossypii*, Glov., commonly attacks the young leaves of *Citrus*, but is controlled by the Braconid, *Lysiphlebus* (*Aphidius*) *testaceipes*, Cress.; *Dinaspis annae*, Malen., and *Icerya purchasi*, Mask., were common on *Citrus*, the latter being, however, controlled by *Novius cardinalis*, Muls.; *Diaprepes famelicus esuriens*, Gyl., causes considerable defoliation of *Citrus* and other plants; the Pyralid, *Pachyzancla* (*Psara*) *periusalis*, Wlk., attacks tomato seedlings under glass and also egg plants, but may be controlled by lead arsenate dusts or sprays applied early; *Ceratitis capitata*, Wied., occurred on oranges, loquats, chillies and guavas; the Eucosmid, *Spilonota smithiana*, Wlsm., which injures young shoots of guava, may be controlled by arsenical sprays or dusts.

Aulacaspis pentagona, Targ. (oleander scale) has been kept in check by *Aphelinus diaspidis*, How., and *Aphis nerii*, Kalt., also occurred commonly on oleander shoots, but was heavily parasitised by *Lysiphlebus testaceipes*. Potatoes were attacked by *Phytometra oo*, Cram., *Macrosiphum solanifolii*, Ashm., *Empoasca fabae*, Harr. (*mali*, LeB.) and *Lygus pratensis*, L. *Diaphania* (*Margaronia*) *hyalinata*, L., causes considerable injury to cantaloup melons, but may be controlled by carefully spraying or dusting the leaves with arsenicals before the fruits are formed. *Comstockiella sabalis*, Comst., occurred on palmetto palms [*Sabal palmetto*].

The pests intercepted included *Fiorinia fioriniae*, Targ., on plants from the Azores; *Pachymerus gonager*, F., on seeds from India; and *Aspidiotus destructor*, Sign., on palms from the West Indies.

NEWMAN (L. J.). **Report of Economic Entomologist.**—*Western Australia Dept. Agric., Ann. Rept. 1923–24*, pp. 20–24. Perth, W.A., 1924. [Received 31st July 1925.]

Attacus ricini (Indian silk worm) [*R.A.E.*, A, x, 629] is now firmly established, particularly along the coast in Western Australia. *Aphelinus mali*, introduced from New Zealand, should prove an active factor in the control of the woolly aphis [*Eriosoma lanigerum*]; it has also been bred from the black orange aphis [*Aphis tavaresi*]. *Nezara viridula* (green tomato bug) is spreading, but so far has been confined to vegetables and lucerne.

Other pests recorded are *Notophallus bicolor* (red-legged earth mite); *Smynthurus viridis* (lucerne flea); *Ceratitis capitata* (Mediterranean fruit-fly); *Chortoicetes terminifera* (plague locust); *Platyedra gossyiella* (pink boll-worm); *Microcerotermes* sp.; *Earias huegeli* (Australian boll-worm); *Cosmopolites sordidus* (banana weevil); *Epicoma melanosticta*, an unusual outbreak of which occurred on flowering gums (*Eucalyptus ficifolia*); *Phthorimaea operculella* (potato moth); *Plutella maculipennis* (*cruciferarum*) (cabbage moth); *Colymbomorpha lineata* (spring beetle), which may be controlled by spraying with 1 lb. lead arsenate to 6 or 8 gals. of water; *Othreis* (*Argadesa*) *materna* (orange-piercing moth), controlled in small gardens by netting; and *Plodia interpunctella*, infesting peanuts from the Northern Territory.

Beneficial insects were *Batrachedra* sp. feeding on *Chrysomphalus* (*Aspidiotus*) *aurantii* (red scale), and *Aphelinus fuscipennis* attacking *Aspidiotus perniciosus*, *C. aurantii* and *Coccus* (*Lecanium*) *hesperidum*.

Forest-tree pests include a Tineid (not yet identified) found mining in the leaves of jarrah [*Eucalyptus marginata*], and which will also attack swamp gum (*E. rudis*) and tuart (*E. gomphocephala*); *Xyleborus* (*Tomicus*) *truncatus* in jarrah; and *Tryphocharia hamata* and *Haplonyx tibialis* on tuart.

The discovery of *Dinoderus minutus* in rattan cane from Batavia emphasises the importance of a strict application of the Quarantine Act.

STOREY (H. H.). **The Streak Disease of Sugar-cane.**—*Union S. Africa Dept. Agric.*, Sci. Bull. 39, 30 pp., 6 figs. Pretoria, 1925.

The information contained in this bulletin has already been noticed from another source [*R.A.E.*, A, xiii, 393].

Departmental Activities : Entomology.— *Jl. Dept. Agric. Union S. Africa*, xi, no. 1, pp. 8–10, 19. Pretoria, July 1925.

An enquiry into the causes of arsenical scorching of pear foliage has been made by F. W. Pettey and D. C. Crawford, whose report is quoted. Scorching was apparently least where the soil was deepest and the moisture best conserved, the trees suffering from drought being evidently less resistant to foliage injury from spraying than those well supplied with moisture. The investigation led to the surprising discovery that lime, when added to an acid lead arsenate, renders soluble a certain amount of insoluble lead arsenate. In one case the addition of 10 per cent. calcium caseinate (made up of a considerable amount of lime) increased the water soluble arsenic from 0·07 per cent. to 1·9 per cent. Various baits were tried against *Ophiusa*, which was abundant on guavas, but neither the baits nor lamps attracted these fruit moths.

Watt's long staple, a variety of cotton usually very susceptible to attack by Jassids, was almost uninfested in some fields in Zululand, though the rainfall and consequent cloudiness and high humidity were excessive during March. The reason for this unusual condition is unknown, but it again raises the question of drainage and local soil and weather conditions as possible important factors. It is, however, recommended that the more hairy, Jassid-resistant varieties of cotton should be grown where serious outbreaks are known to occur.

It has been suggested that owing to the activities of the larvae of a Curculionid inhabiting gall-like swellings on the bases of the plants of vermeerbossie (*Geigeria passerinoides*), one farm has been naturally cleaned of this weed. Its existence has, however, been known to those working on the problem for about 5 years, and it is possible that some other factor was responsible for the death of the plants.

The spray tests for the control of red scale [*Chrysomphalus aurantii*, Mask.] [*cf. R.A.E.*, A, xiii, 282, 351] are briefly summarised. A home-made oil emulsion was effective and twice as cheap as the proprietary miscible oils. Instructions are given for the preparation of the stock solution consisting of 1 gal. standard oil no. 8 (or any lubricating oil of similar viscosity and specific gravity), ½ gal. water, and 1 lb. soft soap or potash fish-oil soap.

Levick (G. T.). **The Woolly Aphis Parasite** (*Aphelinus mali*).— *Jl. Dept. Agric. Victoria*, xxiii, pts. 3 & 6, pp. 171–173 & 363–366, 3 figs. Melbourne, March & June 1925.

A brief account is given of *Aphelinus mali*, Hald., which has recently been introduced into Victoria from New Zealand for the control of the woolly aphis [*Eriosoma lanigerum*, Hausm.]. The work in New Zealand is reviewed [*R.A.E.*, A, xiii, 18]. This parasite has now been liberated in all the more important apple-growing districts in Victoria and practically in every case has become well established. As regards the effect of spraying on the parasite, the work in New Zealand is more or less applicable, and is therefore quoted [*R.A.E.*, A, xii, 70] ; it is recommended that trees should not be sprayed with any oil, tobacco or soap sprays until *A. mali* is so thoroughly established that there is no danger of its accidental extermination by spraying at the wrong time.

FRENCH, Jr. (C.). **Vegetable Pests.**—*Jl. Dept. Agric. Victoria*, xxiii, pt. 6, pp. 321–327. Melbourne, June 1925.

A number of vegetable pests are discussed under their popular names with details of remedial measures that have proved most successful during the past few years.

Destructive Insects and Pests Act, 1914. Notification, no. 756.—*Govt. of India Dept. of Educat., Health & Lands (Agric.)*, 1 p. Typescript. Simla, 24th June 1925.

This amendment to a previous Order [*R.A.E.*, A, xi, 38], prohibits the importation by sea into India of unginned cotton or cotton seeds.

Plant Pests and Diseases Ordinance, 1924.—*Nyasaland Govt. Gaz.*, xxxi, no. 1, suppmt., pp. 3–6. Zomba, 1st February 1924. [Received 21st July 1925.]

This Ordinance prohibits the introduction into Nyasaland of plants or seeds, except by post, or through a specified port of entry. These are conveyed to a place of disinfection and treated as found necessary, at the cost of the importer, who must furnish a certificate of origin. No cotton, coffee, tea, plants cultivated for rubber, mangos, sugar-cane, rice, or tobacco (added by Proclamation, no. 5 of 1924) may be introduced without a special permit, and potatoes must have a certificate from the country of origin of freedom from pest or disease. *Leptinotarsa decemlineata*, Say, is a declared pest under this Ordinance.

Report on the Agricultural Department Montserrat, 1922-23 and 1923-24.—*Imp. Dept. Agric. West Indies*, 50 pp. Barbados, 1925.

The pink boll-worm, *Platyedra* (*Pectinophora*) *gossypiella*, was responsible for the loss of the entire second crop of cotton in many cases in Montserrat. Experiments made with close-spaced cotton, with a view to securing the maximum crop in a limited period of time in order to do away with the second crop, had somewhat contradictory results. During 1922 *P. gossypiella* was first found at the end of June, but in 1923 it was first observed about a fortnight later. The results of examinations of cotton bolls collected from estate fields during the two years under review clearly indicate the rapid extension of damage occurring over a comparatively short period of time. According to the Cotton Protection Ordinance of 1922, all seed should be fumigated with carbon bisulphide at the rate of 1 lb. to 120 cu. ft. of chamber space. A double fumigation did not materially reduce the germinating qualities of the seed.

PAYNE (N. M.). **Can Insects survive Freezing?**—*Canadian Ent.*, lvii, no. 7, pp. 157–158. Orillia, Ont., July 1925.

Freezing, in this paper, is considered as an actual crystallisation of tissue or body fluid, or both, accompanied by giving off of heat. In experiments with various insects, the technique employed is described, and the results show that there are some insects that cannot survive freezing, but that in certain groups normally exposed to low temperatures there are others that can freeze without dying, such as *Dendroides bicolor*, Newm. (*canadensis*, Lec.) and *Elater* spp.

Delassus (M.). **Contribution à l'étude de l'Eudemis en Algérie.**—*Bull. Soc. Hist. nat. Afr. N.*, xvi, no. 6, p. 166. Algiers, 1925.

The parasites, *Dibrachys boucheanus*, Ratz., *D. affinis*, Masi, and *Hemiteles areator*, Grav., have recently been reared from *Polychrosis botrana*, Schiff., in Algeria.

Balachowsky (A.). **Note sur deux prédateurs du *Parlatoria blanchardi* Targ., et sur leur utilisation en vue de la lutte biologique contre ce Coccide.**—*Bull. Soc. Hist. nat. Afr. N.*, xvi, no. 6, pp. 167–172, 1 pl., 1 fig. Algiers, 1925.

Though *Parlatoria blanchardi*, Targ., occurs in many localities in Algeria, its economic importance is not everywhere alike. Recent investigations have shown that the predacious Nitidulid beetles, *Cybocephalus seminulum*, Baudi, and *C. flaviceps*, Reitt., are capable of keeping down this Coccid, but they only occur in some localities. Where the Coccid has been introduced without its natural enemies, it develops into a major pest of date palms. The transport of these beetles into infested areas is very difficult as they do not survive more than 2 days in captivity even with an abundance of food.

The Coccinellid, *Pharoscymnus anchorago*, Fairm., has been found in company with *Cybocephalus* on leaves infested by the Coccid.

Regnier (R.). **L'Anthonome du Pommier** (*Anthonomus pomorum* **L.**). —*Ann. Epiphyties*, xi, no. 1, pp. 5–45, 2 pls., 12 figs. Paris, January–February 1925. [Received 4th August 1925.]

An extensive account is given of the morphology and biology of *Anthonomus pomorum*, L., as studied in Normandy under natural and artificial conditions. The winter is passed as an adult under the bark, in the cracks of the tree and more rarely at the base of the tree in the superficial layer of soil. The hibernation period varies according to temperature conditions and the duration of the food reserves of the weevil; it usually begins about the end of September and lasts until March. Immediately on emergence from hibernation both sexes pierce the young buds of the apple in search of food, and both use their wings in passing from one tree to another. Sticky bands, therefore, do not prevent the females from reaching the buds for oviposition. In Normandy the eggs are laid from April onwards. They hatch in from 6 to 12 days according to the temperature. Larval development continues for 3 to 4 weeks, and by the time the insect is ready to pupate, the flower is more or less desiccated, but remains attached by the stalk. Pupation occurs in the flowers in May or the beginning of June. The flowers usually remain on the tree until after the adult has emerged, and no case of pupation in the soil was observed. The adults at once attack the foliage, and could not be induced to feed on any trees other than apple. This feeding period lasts for about a fortnight, after which a period of aestivation occurs, the adults hiding in any suitable place. About September slight feeding again occurs on the leaves of apple, after which the winter quarters are selected.

During hibernation many of the weevils are destroyed by the fungus, *Beauveria globulifera*. Of the natural enemies of the larvae, *Pimpla pomorum*, L., *Bracon discoideus*, Wesm., and *Habrocytus fasciatus*,

Thoms., were reared during the present observations. Many larvae are destroyed by birds.

The comparative immunity of pears in Normandy as compared with apples is probably due to their earlier and more rapid blossoming. The buds are thus too far advanced for the eggs to be laid in them.

The various recommendations for the mechanical and chemical destruction of the pest are reviewed and criticised. The author favours the straw traps recommended by Balabanov [*R.A.E.*, A, iv, 495], provided that they are applied in June in order to attract the aestivating adults. Lime-sulphur does not kill the weevils, but acts as a repellent and allows the tree to complete its blossoming. Suggestions are made for the possible means of forecasting outbreaks of *A. pomorum*.

POUTIERS (R.) & LARDAT (G.). **Les essais de traitement contre la Mouche de l'Olive** (*Dacus oleae* **Rossi**) **dans les Alpes-Maritimes en 1923.**—*Ann. Epiphyties*, xi, no. 1, pp. 51–61, 1 pl., 1 fig. Paris, January–February 1925. [Received 4th August 1925.]

Extensive experiments were made in the South of France in 1923 to test the efficacy of bait-sprays for the control of *Dacus oleae*, Rossi, under local conditions. The area treated and the method employed are described in detail. The bait consisted of 1,000 parts water, 100 parts molasses, and 2 parts sodium arsenate (by weight). The sprayings were applied in three series in July, August and September respectively, and it is considered that the results justify the expenditure entailed. In another series of tests made at the same time with diplumbic lead arsenate at the rate of 2 per 100 instead of sodium arsenate 2 per 1,000, the results were very similar, though slightly less effective. They clearly demonstrate the value of insoluble arsenates for the control of this fly.

FAURE (Jean C.). **Sur la multiplicité des parasites de l'*Apanteles glomeratus* L.**—*C.R. Soc. Biol.*, xciii, no. 26, pp. 524–526. Paris, 24th July 1925.

Of the various parasites of *Apanteles glomeratus*, L., that have been recorded, the following have been found in the region of Lyons: *Tetrastichus rapo*, Wlk., *Dibrachys boucheanus*, Ratz., *D. affinis*, Masi, *Catolaccus ater*, Ratz., *Hemiteles areator*, Grav., *H. fulvipes*, Grav., and *Pezomachus instabilis*, Först.

Other species, not previously recorded, are *Eurytoma appendigaster*, Dalm., *Pteromalus variabilis*, Ratz., *Psilocera obscura*, Wlk., *Monodontomerus dentipes*, Boh., *Hemiteles submarginatus*, Bridgm., *Pezomachus nigritus*, Först., and *Homoporus luniger*, Nees, var. *braconidis*, Ferrière & Faure, from the Lyons district, and *Schizonotus pailloti*, Ferr. & Faure, from the Auxonne region. Of the 27 Hymenopterous parasites known to attack *A. glomeratus* seven also attack *Anilastus ebeninus*, Grav., the Ichneumonid parasite of *Pieris brassicae*, L.

VAYSSIÈRE (P.) & MIMEUR (J.). **Les Pyrales du Cotonnier** (*Sylepta derogata* **F. et** *Glyphodes indica* **Saund.) en Afrique occidentale française.**—*Agron. colon.*, no. 90, pp. 255–268, 4 figs. Paris, June 1925.

The only Pyralids attacking the leaves of cotton in French West Africa are *Sylepta derogata*, F., and *Margaronia* (*Glyphodes*) *indica*, Saund. The

last-named appears to be of relatively little importance. In the French Sudan it occurs on egg-plants, various cucurbits and rarely on cotton. The eggs are laid on the leaves, where pupation also occurs. The larval stage lasts about 16 days and the pupal stage about 11 days. Reproduction continues throughout the year. It could no doubt be controlled on cotton by arsenical sprays should occasion arise.

Sylepta derogata feeds on various malvaceous plants and also on *Corchorus* sp.; *Celosia cristata* and *Achyranthes aspera*. In the French Sudan it has only been found on *Hibiscus esculentus*, *Abelmoschus moschatus* and both indigenous and imported cotton. The length of the various stages in the Sudan are 5–10, 16–29, and 8–10 days respectively for the egg, larva and pupa. A comparison of these figures with those from Nyasaland and India shows the greatest variation between the different countries to occur in the egg stage. There are probably five generations annually. Hibernation occurs in the larval stage in the soil, the emergence of the adults depending on atmospheric humidity. The eggs are laid in groups of variable numbers on both sides of the leaves, particularly on the upper surface. The larvae feed on the leaves. Indigenous cotton as a rule recovers from attack by producing fresh foliage, but imported varieties dry up and die off. Clean cultivation, and the collection and destruction of larvae and alternate food-plants are the most important remedial measures. *Hibiscus* may be grown as a trap crop for the first generations, but should be destroyed as soon as the cotton plants appear.

Various new parasites and hyperparasites of *S. derogata* have been reared, and are described by C. Ferrière in an appendix. They comprise *Bracon* sp.; *Apanteles syleptae*, sp. n., the most abundant parasite; *Stictopisthus africanus*, sp.n., and *Eupelmus soudanensis*, sp.n., the last two being hyperparasites.

VAYSSIÈRE (P.). **Sur les propriétés antiparasitaires du paradichlorobenzène.**—*C. R. Acad. Agric. France*, xi, no. 26, pp. 719–724. Paris, 1925.

The work in connection with paradichlorobenzene for the control of insect pests in France and elsewhere is briefly reviewed, the undoubted value of this substance being pointed out.

FEYTAUD (J.). **Sur les ravages causés par un Symphyle** (*Scutigerella immaculata*, **Newport**).—*C.R. Acad. Agric. France*, xi, no. 26, pp. 725–726. Paris, 1925.

A centipede, *Scutigerella immaculata*, Newp., is recorded, apparently for the first time from France, as causing considerable injury to maize. In some cases in the south-east the crop has been destroyed by it. The infestation is increased by the use of farm manure. An investigation of remedial measures has been undertaken at Bordeaux.

DELASSUS (—). **Les invasions de stauronotes marocains en Algérie en 1925 et les procédés modernes de lutte contre les acridiens.**—*Rev. agric. Afr. N.*, xxiii, nos. 312–313, pp. 493–498 & 508–511, 8 figs. Algiers, July 1925.

An unexpectedly large invasion by *Dociostaurus maroccanus*, Thnb., occurred in many localities in Algeria during 1925. The infestation

arose from breeding grounds that had been overlooked or not reported. Unless prompt and extensive measures are adopted, a more serious invasion still is predicted for 1926.

HAWLEY (I. M.). **The more important Insects injurious to the Sugar-beet in Utah.**—*Utah Agric. Expt. Sta.*, Circ. 54, 45 pp., 33 figs. Logan, Utah, April 1925. [Received 5th August 1925.]

This is a useful summary of the subject in a popular form, the insects recorded being grouped under those attacking the foliage and those feeding on the roots.

GENIEYS (P.). *Habrobracon brevicornis*, **Wesm.**—*Ann. Ent. Soc. America*, xviii, no. 2, pp. 143–202, 35 figs. Columbus, Ohio, June 1925.

This paper is a translation from the French by Dr. L. O. Howard. The author has made an extensive and detailed study of the life-history and habits of *Habrobracon brevicornis*, Wesm. The effects of environment, including temperature, weather, nutrition, etc., and their results on the different stages of the insect, are discussed at length, and the morphology is described in detail. From the literature on the various hosts of *H. brevicornis*, it would seem that though it is a polyphagous parasite, it is limited to certain groups. In exceptional cases it may be reared from Noctuids, but the preferred hosts are Pyralids and Tortricids. Examination of a number of individuals from different hosts has shown them all to be very similar to those obtained from *Pyrausta nubilalis*, Hb., except for modifications in size due solely to the quantity of nutritive matter furnished by the host. The eggs are laid on the larva of the host along its long axis and are easily removed; when more than one is laid the number may vary from 3 to 6. They are usually placed between the body of the larva and the surface supporting it. Before oviposition the female stabs the victim until it is paralysed, and though it may be seen sucking at the puncture in an incompletely paralysed larva, it will never lay eggs on it. The eggs generally hatch in about 35 hours. As soon as the larva emerges, it attaches itself to any part of the host and begins feeding on it. It is usually ready to spin its cocoon in from 72 to 96 hours from the time of hatching. When full grown the larva leaves the body of the victim and makes a delicate and widespread network. Transformation is more rapid in the summer, the pupal period varying from five days in August to 15 in November. Under certain conditions the author was able to obtain evidence of the existence of an aspirating apparatus in *H. brevicornis* [*cf. R.A.E.*, A, x, 86, 364].

GLASER (R. W.). **A Bacterial Disease of Silkworms.**—*Jl. Bact.*, ix, no. 4, pp. 339–355, 4 figs. 1924. (Abstract in *Expt. Sta. Rec.*, lii, no. 7, p. 659. Washington, D.C., May 1925.) [Received 10th August 1925.]

An account is given of a bacterial disease that assumed epidemic proportions among silkworms. A bacillus was isolated from the faeces, blood and various tissues of diseased living and dead larvae. This is not apparently transmitted through the egg and is presumably spread as a result of the food being infected by the faeces and body fluids of dead and dying individuals.

Taylor (R. H.) & Philp (G. L.). **The Almond in California.**—*California Agric. Expt. Sta.*, Circ. 284, 57 pp., 19 figs. Berkeley, Cal., April 1925.

This is a revision of an earlier paper [*R.A.E.*, A, ix, 97]. The insect pests not previously mentioned are *Paratetranychus pilosus*, C. & F. (citrus mite) and *Taeniothrips inconsequens*, Uzel.

Hinds (W. E.) & Bradley (W. G.). **Department of Entomology.**—*Ann. Rept. Agric. Expt. Sta. Louisiana State Univ. & Agric. & Mech. Coll. 1924*, pp. 18–30. Baton Rouge, La., 1925.

The cotton boll weevil [*Anthonomus grandis*, Boh.] was largely controlled by natural factors. In comparative tests with calcium arsenate and lead arsenate the former on the whole gave the better results. In all tests there was an average of 4 per cent. greater mortality when the dusts were applied to plants moist with dew.

Experiments on the times of planting for the control of *Diabrotica duodecimpunctata*, Oliv. (southern corn root worm) in 1924 show that the first injury occurred on seed planted 31st March and the maximum in plantings of 8th April. None of the substances tried round young maize for the control of this beetle proved of any value.

Murayama (J.). **On the Platypodidae of Formosa.**—*Jl. Coll. Agric. Hokkaido Imp. Univ.*, xv, pt. 4, pp. 197–228, 3 figs., 4 pls. Sapporo, Japan, June 1925.

Among the species dealt with are several new ones described by the author and Professor Niijima, including *Crossotarsus rengetensis*, attacking, amongst other trees, *Melia azedarach* and *Cinnamomum camphora*; *Platypus lepidus formosanus*, subsp.n., in *C. camphora* and other trees; *P. formosanus*, in *Styrax formosanum* and *Sapium discolor*; and *Diapus formosanus*, in *Lithocarpus konishii*.

In general the trees most readily attacked by Platypodids belong to the Lauraceae, the borers being most abundant in newly felled and stacked timber. The most injurious species are *Crossotarsus externedentatus*, Fairm., and *C. rengetensis*, the large and complicated galleries caused by the latter species greatly reducing the value of the timber. All unnecessary fellings should be avoided and the logs removed as soon as possible, and general forest sanitation and the most efficient methods of forest protection should be applied.

Murayama (J.). **Supplementary Notes on "The Platypodidae of Formosa."**—*Jl. Coll. Agric. Hokkaido Imp. Univ.*, xv, pt. 4, pp. 229–236. Sapporo, Japan, June 1925.

In this supplement the additional new species are:—*Crossotarsus quercivorus* in *Quercus glauca*, *Q. gilva* and *Lithocarpus edulis*; *C. simplex* in *Q. glauca* and *Q. gilva*; and *Platypus tenuis*, which is possibly the female of *P. hamatus*, Blandf. The female of *P. calamus*, Blandf., is described for the first time.

UICHANCO (L. B.). **A neglected Phase of Insect Control Work in the Philippines.**—*Philipp. Agriculturist*, xiv, no. 2, pp. 55–56. Los Baños, July 1925.

The work of various countries in connection with the biological control of insects is described, and the organisation of similar undertakings in the Philippines is urged.

DAVIDSON (J.). **A List of British Aphides.**—8vo, xi+176 pp. London, Longmans, Green & Co., 1925. Price 12*s.* 6*d.* net.

This book, which is one of the Rothamsted Monographs on Agricultural Science, is divided into four main parts: A list of all the known British species of Aphids (Aphidoidea), together with their important synonyms, and their food-plants and distribution as recorded in Britain; a list of the genera used with the species in the first section, together with certain critical notes and important synonyms; a list of the food-plants upon which Aphids have been recorded in Britain, with the species found on them; and a bibliography containing the principal references to the literature of the group and including all the papers mentioned in the body of the work.

The lists include 397 valid species and 178 synonyms. For certain definite migrating species the primary and secondary food-plants are indicated. A few records of food-plants not hitherto published are included.

The work does not claim to be a critical study of the British species, but rather an examination of the published data on them. They are placed in the genera that the author considers to represent their correct disposition in the light of present-day research.

PRIESNER (H.). **Katalog der europäischen Thysanopteren.** [Catalogue of European Thysanoptera.]—*Konowia*, iv, no. 3–4, pp. 141–159. Vienna, 1st July 1925.

This list is compiled according to the most recent data available, the reasons for changes in classification being given in the author's work "Die Thysanopteren Europas" now in the press.

SPESSIVTSEFF (P.). **Zur Generationsfrage der Borkenkäfer. Vorläufige Mitteilung.** [The Question of the Number of Generations of Bark-beetles. Preliminary Communication.]—*Ent. Tidskr.*, xlvi, no. 2, pp. 102–106. Stockholm, 10th July 1925.

Pityophthorus micrographus, L., bred experimentally near Stockholm, was found to have a 2-year cycle. Eggs in June 1922 gave rise to larvae that hibernated; the first pupae appeared in the summer of 1923; young adults appeared in July 1923, which, after hibernating, oviposited in May 1924. *P. trägardhi*, Spess., is another species with a similar 2-year cycle. The eggs of *Cryphalus saltuarius*, Wse., collected in June 1923 gave rise to young adults in June 1924, and these hibernated. Observations on another batch of eggs showed that the larvae hibernate also. *Carphoborus cholodkovskyi*, Spess., was observed in material collected in August 1923, when eggs were being laid and some larvae were hatching out. In May 1924 the females that had hibernated in the mines they had begun in autumn, continued mining and ovipositing. By mid-summer the galleries were completed and the larvae had attained from a half to two-thirds of their full size. By October 1924 most of the larvae were mature, but inspection in March 1925 failed to reveal any pupae.

FOREL (A.). *Monomorium pharaonis* **in Genfer Hotels.** [*M. pharaonis* in Hotels at Geneva.]—*Mitt. Schweiz. Ent. Ges.*, xiii, no. 8, pp. 427–428. Berne, 1925.

To control an outbreak of the ant, *Monomorium pharaonis*, L., in a Geneva hotel, the advice was given to ascertain what night temperature at Geneva kills this tropical species by putting some individuals in a box placed out of doors. The insects could then be destroyed by closing down the central heating apparatus and opening all windows for a few nights that are sufficiently cold. These infestations originate in tropical food-stuffs.

DE KONING (M.). **Een gevreesde vijand voor onze dennenbosschen.** [A feared Enemy of our Pine Forests.]—*Tijdschr. Plantenziekten*, xxxi, no. 7, pp. 165–166. Wageningen, July 1925.

In May and June *Bupalus piniarius*, L., oviposits on the needles of *Pinus sylvestris*, the eggs being laid in rows of 5–10. The moths are usually found amongst trees 20 to 30 years old. The caterpillars appear in June and begin feeding on the needles, the injury increasing as they become more mature, full growth being reached in September. They pupate in the soil.

HERING (M.). **Minenstudien V.**—*Zeitschr. wiss. Insektenbiol.*, xx, nos. 5–6, 7, pp. 125–136, 161–174, 8 figs. Berlin, 15th June & 20th July 1925. **Minenstudien VI.**—*Zs. Morphol. Oekol. Tiere*, Abt. A. iv, no. 3, pp. 502–539, 15 figs. Berlin, 17th July 1925.

These further papers [*R.A.E.*, A, xiii, 17] on leaf-mines deal with insects of various orders obtained by breeding. A number of new species are described, but they are not from plants of economic importance.

WÜNN (H.). **Zehn für die deutsche Fauna neue und einige schon bekannte seltenere Cocciden.** [Ten Coccids new to the German Fauna and some rather uncommon Species already known.]—*Ent. Mitt.*, xiv, no. 3–4, pp. 202–205. Berlin, 20th July 1925.

The list of new records comprises:—*Ceroputo pilosellae*, Sulc., *Xylococcus filifer*, Lw., *Eulecanium* (*Lecanium*) *prunastri*, Boy., *Phenacoccus piceae*, Lw., *Aspidiotus wünni*, Ldgr., *Eriococcus insignis*, Newst., *Ortheziola vejdovskyi*, Sulc., *Pseudococcus walkeri*, Newst., *Pulvinaria artemisiae*, Sign., and *Aspidiotus labiatarum*, March.

BARRETO (B. T.). **Plantas hospederas de la mosca prieta.** [Food-plants of *Aleurocanthus woglumi*.]—*Rev. Agric. Com. y Trabajo*, vii, no. 5, pp. 47–50, 3 figs. Havana, 1925.

A list is given of the numerous food-plants of *Aleurocanthus woglumi*, Ashby, observed in Cuba.

ARISZ (W. H.). **Verslag over het jaar 1924.** [Report of the Besoeki Experiment Station for 1924.]—*Meded. Besoekisch Proefst.*, no. 38, 70 pp. Djember, 1925.

The caterpillars of *Phytometra* (*Plusia*) sp., etc., attacking tobacco, gave trouble only where spraying with lead arsenate had not been practised. The infestation of coffee by the berry borer [*Stephanoderes hampei*] was estimated at from 5 to 10 per cent. of the crop.

VAN DER GOOT (P.). **Levenswijze en bestrijding van den witten rijstboorder op Java.** [Life-history and Control of the White Rice-borer in Java.]—*Meded. Inst. Plantenziekten*, no. 66, 308 pp., 33 tables, 1 pl., 10 figs., 9 charts. Buitenzorg, 1925. (With a Summary in English.)

Serious damage by rice-borers has been recorded in Java for many years, the more important losses being due to the white rice-borer, *Scirpophaga innotata*, Wlk. (*sericea*, Snell.). A short description is given of the various stages of this moth. The larvae are greyish white at first, changing to a creamy white after the third moult. The pupa is yellowish white, always enclosed in a white cocoon. No reliable morphological differences distinguishing the immature forms from those of the yellow rice-borer, *Schoenobius incertellus*, Wlk. (*bipunctifer*, Wlk.) have been found, though there are a few useful differences in colour.

The moths appear to have considerable powers of flight, and in one generation may spread three miles from the original infestation. Both sexes are attracted by light, the females always being in the majority.

The eggs are laid in clusters on the undersides of the leaves of rice. The larvae hatch in 6–8 days and bore inside the young plant from the top downwards, causing the young tips to die. In plants attacked at flowering time the young larvae enter the flower-stalk and in boring downwards cut it off at the base. There are usually five moults, including the pre-pupal one, during the larval period, which averages 31 days with a minimum of 25. Pupation takes place in the lower part of the plant and generally lasts 7–9 days. In the plains the total development averages 39 days. In plants at flowering time the larvae do not pupate, but pass through two or three more moults and then enter a period of aestivation in the underground part of the stubble that lasts several months. The phenomenon of aestivation, which is observed only in maturing plants, may be due to the different composition of the available food. The divergence from normal larvae appears after the fourth moult. At harvest-time the aestivating larvae are 28–38 days old and are found at different heights inside the stalk ; some 40–85 per cent. are already in the underground portion, and these cannot be reached by burning the stubble immediately after harvest. During the following months the larvae remain in the stubble, protecting themselves by a white cocoon from extremes of drought or moisture, but they are nearly all killed if rain sets in within 3 months of the harvest. After 5 months' drought 16 per cent. survived in tilled fields, and 37 per cent. in fields with untouched stubble. This dormant stage is ended by the first showers of the rainy season, but not unless it has lasted at least $4\frac{1}{2}$ months. After a dormant period of $4\frac{1}{2}$–$5\frac{1}{2}$ months, the majority of the moths will emerge 6–8 weeks after rain, and somewhat sooner if the period has extended to

6 months or more. Field observations agree fairly well with these laboratory data, and it therefore seems possible to predict the probable date of the maximum flight, as soon as the first shower has fallen. In normally dry years this will be 4 weeks later.

The number of generations varies with the kinds of rice cultivated and the length of the planting period. With late-maturing varieties (120 days) and quick transplantation, only four generations will occur, the fourth beginning its dormant stage in the ripening crop. When transplanting covers a longer period, a small fifth generation may develop in the youngest fields. If rice is planted all the year round, nine or ten generations may occur, but in most parts of Java four or five are the rule.

In seed-beds oviposition mainly occurs on plants 7–14 days old, and young seedlings sown very thickly show less infestation, apparently because the moths cannot move freely among them. According to Dammerman the average annual loss in one important district of Java is 11 per cent., and in some years up to 37 per cent. of the crop has been destroyed. The new crop becomes infested from the stubble of the preceding one; and no food-plants other than rice have been noticed.

Egg-parasites are the most valuable of the natural enemies, an average of 72 per cent. of the egg-clusters being parasitised. The Proctotrupid, *Phanurus beneficiens*, Zhnt., parasitises about 50 per cent. of the clusters, *Trichogramma australicum*, Gir., about 6 per cent., and *Tetrastichus* sp., 15 per cent. Larval parasites are unimportant; those observed include *Apanteles* sp., *Eripternimorpha dammermani*, Roh., *Stenobracon maculata*, Mats., and *Shirakia dorsalis*, Mats. A parasite of the pupae, *Eripternimorpha scirpophagae*, Roh., is sometimes rather common.

As regards remedial measures, burning or ploughing the stubble after the harvest are ineffective, but ploughing the irrigated stubble-fields in preparation for a crop of dry-monsoon rice kills the larvae in 10–14 days. Flooding the stubble-fields towards the end of the dry season should be practised when possible. Light-traps have no appreciable effect on the infestation. The collection of egg-clusters on the seed-beds is easy and useful on small areas. Infested seedlings should not be used, if possible, but it is a waste of money to destroy heavily infested beds and leave others to develop the infestation. Heavy losses at harvest-time may be expected when the planting is late, but, though early planting is advisable, care must be taken that the pre-flowering period (40–45 days before harvest) does not coincide with the fourth flight of moths or a total crop failure may result. Bearded varieties of rice are more susceptible. Instructions are given for applying the measures recommended in the various districts of Java.

FRIEDERICHS (K.). **Verslag van den Entomoloog over het kweeken en de eerste verspreiding der Sluipwesp, *Prorops nasuta*, Waterst., van 21 Januar t/m 20 Juli 1924.** [Report of the Entomologist on the Breeding and first Distribution of the Hymenopterous Parasite, *P. nasuta*, from 21st January to 20th July 1924.]—*Meded. Koffiebessenboeboek-Fonds*, no. 13, pp. 1–11. Malang, 1925.

Two parasites, *Heterospilus coffeicola*, Schmied., and *Prorops nasuta*, Wtrst., for use against the coffee-berry borer [*Stephanoderes hampei*, Ferr.] were obtained in 1923 in Uganda and shipped to Java, where

the Institute for Plant Diseases, Buitenzorg, decided to breed the latter.

In January 1924 some of the material was brought to Malang and bred out by the author, who followed the method used at Buitenzorg. The parasites were kept for 2–3 days in a glass box, mating and feeding on berry borer brood and brown sugar placed on green leaves. These individuals were then placed in a cage of fine copper gauze with infested red and black coffee-berries. After 14 days these berries were placed in a trap cage, where the emerging parasites were caught in glass boxes on seeking to reach the light. The males emerged about 7–8 a.m., and the females from 11 a.m. to 1 p.m. or later. The borer beetles emerged from the middle of the day onwards, and the boxes were full of them on the following morning, when they were removed, the parasites being left and transferred to the feeding box. The latter are not inclined to fly, and except for a short period immediately after emergence they live in the berries. The berries in the cages yielded other insects, including a Lepidopterous larva that feeds inside the berries, the fruit-fly, *Dacus ferrugineus*, F., harmless Cecidomyiids and Psocids, and the beetles, *Araecerus fasciculatus*, DeG. (in large numbers), *Carpophilus* sp., and some Cucujids, including *Cathartus advena*, Waltl, and *Emporius signatus*, Frauenf. Investigations showed that *C. advena* feeds on débris, fungi and dead coffee borers, and the other species do not affect either the borer or its parasite, so that they were not responsible for a reduction in the number of parasites obtained in July. This was traced to a drop of about 4° C. (7·2° F.) in the average and minimum temperatures from 20th June to 20th July. An attempt to counteract this by placing the cages in sunshine was a failure, probably owing to the cool nights.

The method adopted of establishing the parasite in the open is to choose a bush of *robusta* coffee with many ripe berries and in a sunny situation. This is cleared of ants, and baskets containing moderate layers of borer-infested red berries are hung between the branches to serve as a supply for the first food of the parasites. The bush is then enclosed in a cotton cloth secured round the stem, and 120–150 parasites are introduced through an aperture at the top, which is then sewn up. This cover is removed four weeks later. The berries on the adjacent bushes are left unpicked, and the further spread of the parasites is effected by means of baskets containing berries harbouring them. In the wet season it would be better to substitute bags of coarse fabric or plaited bamboo for these baskets. Fallen berries should not be left on the ground in the rainy season, where they will rot, but should be put on wire netting, allowing the water free passage, and placed under the bushes for shelter against rain and sun. Whether this parasite can check the borer is not yet known, but the maintenance of foci of the borer, without which the establishment of the parasite cannot be effected, is considered justifiable at present.

Begemann (H.). **Het kweeken van de sluipwesp op de ondernemingen.** [The Breeding of the Parasite on the Estates.]—*Meded. Koffiebessenboeboek-Fonds*, no. 13, pp. 12–20, 1 pl. Malang, 1925.

In this address to the members of the planters' association against the coffee-berry borer [*Stephanoderes hampei*, Ferr.], the general factors influencing the life of Hymenopterous parasites and determining their increase are discussed. In Malang the period required to produce a

new generation of *Prorops nasuta*, Wtrst., is 24 days, or less than in Uganda. On an average the females live more than a month, and it is probable that most of them pass almost their whole lives in the berries. Dead borers only were found in berries in which the parasites had developed. In view of the fact that the males emerge from the berries a few hours before the females, the breeding cage should be fitted with a chamber that the borers cannot enter, but in which the male parasites can be retained until they are joined by the females. They can then all be liberated together by opening a door about 1 p.m., if the weather conditions permit.

FRIEDERICHS (K.). **Handleiding voor de bestrijding van den Koffiebessenboeboek.** [Instructions for combating the Coffee-berry Borer.]—*Meded. Koffiebessenboeboek-Fonds*, no. 13, pp. 24–34. Malang, 1925.

These instructions embody all the data published on the subject. The various originals have already been noticed in this *Review*.

COLCORD (M.). **Index III to the Literature of American Economic Entomology, 1920 to 1924.**—*Amer. Assoc. Econ. Ent.*, Spec. Pubn. 3, x+441 pp. Melrose Highlands, Mass., 1925. Price $6.50.

This volume, arranged on similar lines to that for the previous five years [*R.A.E.*, A, ix, 396], is improved by marginal indications as to new species, bibliographies, illustrations, and approved common names, and by the omission of the less important references to a given insect or topic.

WERTH (E.). **Apfelblütenstecher und Birnknospenstecher.** [The Apple Blossom Weevil and the Pear Bud Weevil.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 8, pp. 64–66, 6 figs. Berlin, 1st August 1925.

As the apple blossom weevil [*Anthonomus pomorum*] may attack one bud only in an inflorescence, the damage it does is not always serious. In the case of the pear bud weevil [*A. cinctus*], however, owing to the much earlier date of its attack, the entire pear bud, including the leaves and all the blossoms, is affected.

TRAPPMANN (W.). **Vergleichende Messung der Schwebfähigkeit von Arsenmitteln.** [The Comparative Measurement of the Power of Suspension in Arsenical Solutions.]—*Nachrichtenbl. deutschen Pflanzenschutzdient*, v, no. 8, pp. 66–67, 1 fig. Berlin, 1st August 1925.

Uniformity in the composition of a spray solution is very necessary, and this implies that the chemicals of which it is composed should remain in suspension. Hitherto the power of suspension has been measured by the depth of the precipitate deposited, but the author suggests the use of a sediment determinator consisting of two vertical glass tubes connected at the bottom by a passage closed by a tap. One tube is filled with water and the other with the arsenical spray solution, and when the tap is opened, the heavier arsenical solution falls to a lower level than the water. As the chemical particles are

gradually deposited the level of the solution thus lightened rises until it ultimately reaches that of the water column. The longer the time required for this equilibrium the greater the suspension power present.

KRIEG (—). **Schädlingsbekämpfung mit arsenhaltigen Ködern.** [Pest Control by Means of Baits containing Arsenic.]—*Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxv, no. 1–5, pp. 59–62. Jena, 30th July 1925.

This is a brief survey of the subject of the various arsenical baits used chiefly against insect pests such as the olive fly [*Dacus oleae*], locusts, etc., with references to the literature. Practically all the original papers have already been noticed.

BÖRNER (C.) & SPEYER (W.). **Die Blutlausplage und ihre Bekämpfung.** [The Woolly Aphis Pest and its Control.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 33, 9th edn., 4 pp., 5 figs. Berlin, July 1925.

This circular gives a brief account of the life-history and natural enemies of the woolly aphis, *Eriosoma* (*Schizoneura*) *lanigerum*, Hsm., the control of which is thought to lie in the selection of resistant varieties of apple [*R.A.E.*, A, xi, 243, etc.].

SPEYER (W.). **Wurmstichige Aepfel und Birnen.** [Wormy Apples and Pears.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 40, 7th edn., 4 pp., 5 figs. Berlin, June 1925.

Brief notes are given on the bionomics of *Cydia* (*Carpocapsa*) *pomonella*, L., and its control by spraying with lead arsenate.

S[CHENK] (P. J.). **Bladrollers in hulst.** [Leaf-rollers on Holly.]—*Floralia*, xlvi, no. 32, pp. 496–497, 1 fig. Assen, 7th August 1925.

The caterpillars of the Tortricid, *Epiblema ophthalmicana*, Hb., roll the leaves of holly in Holland, especially in nursery plants, to which considerable damage is done. Spraying with a 0·5 per cent. solution of lead arsenate is the remedy suggested.

RONDELLI (M.). **Osservazioni sulla simbiosi ereditaria negli Afidi gallicoli** (*Eriosoma*). [Observations on Hereditary Symbiosis in Gallicolous Aphids.]—*Atti R. Accad. Scienze Torino*, lx, pp. 86–88. Turin, 1925.

This preliminary note records the discovery of two symbiotic fungi in two gallicolous Aphids of the elm, *Eriosoma lanuginosum*, Htg., and probably *E. inopinatum*, Alfieri.

[NOVOPOLSKAYA (E. V.).] **Новопольская (Е. В.). Почковая вертунья** (*Tmetocera ocellana* **F.**). [*Eucosma ocellana*, F.]—*La Défense des Plantes*, ii, no. 2, pp. 66–69, 2 figs. Leningrad, May 1925.

The larvae of *Eucosma* (*Tmetocera*) *ocellana*, F., cause serious injury to apple trees in the Crimea, attacking the leaves, flowers and

fruit. In spring the flower-buds are webbed together by the larvae that have hibernated, and the whole inflorescence is destroyed. The ends of the opening leaves are also webbed together. Pupation may occur there or in the inflorescence. The first pupae were found in the middle of May, and the moths were on the wing during the first half of June. The eggs are laid on both sides of the leaves, but mainly on the upper surface, and hatch in 6 to 8 days. The larval stage lasts 28 to 30 days. The larvae of this generation apparently pupate under the bark scales, only one pupa having been found among the leaves. The resulting moths are on the wing in the latter half of July, and lay their eggs in the same places as the previous generation. The larvae hatch in 6 days. Under favourable weather conditions a partial third generation may occur. The feeding in the summer and autumn differs from that in the spring. Under cover of a webbing the leaves are skeletonised ; a leaf may also be webbed to the fruit, the latter being attacked under the cover of the leaf. These injuries to the fruit were first found at the beginning of August. About the 30th September hibernation begins ; for this purpose a cocoon is spun close to the flower buds, or more frequently in the fork between the fruit branch and the leaf shoot, under cover of a protruding scale or an accidentally caught up dry leaf.

Though chiefly found on apple this pest may also occasionally attack pear, quince and cherry. The larvae are parasitised by an undetermined Ichneumonid.

In certain localities in the Crimea *Argyroploce* (*Olethreutes*) *variegana*, Hb., is very abundant.

[Novopolskaya (E. V.).] **Новопольская (Е. В.). Листовая моль** [Leaf moth] *Recurvaria nanella* **Hb.**—*La Défense des Plantes*, ii, no. 2, pp. 70–72, 3 pls. Leningrad, May 1925.

These observations on the life-history of *Recurvaria nanella*, Hb., were made in the Crimea in 1923 and 1924. Hibernation occurs in the larval stage inside a cocoon. The larvae become active in the spring as soon as the sap flow begins. At first they attack the leaf buds, particularly of apple, and later the flower buds, eating out the centres. They also occur on apricots, plums, cherry, peach, almond, etc. Pupation begins in the latter half of May and occurs in a cocoon in any suitable place on the tree or on the ground. The first adults were noticed on the 11th June, emergence continuing into July. The eggs are mostly laid on the lower surface of the leaves. They hatch in 13 or 14 days, the larvae at once boring into the leaf tissue and remaining hidden in the mine until the time of hibernation. The parenchyma is eaten, but the epidermis remains untouched. As many as six mines may occur on one leaf. Both Ichneumonids and Chalcids have been reared from the larvae and pupae.

[Bogdanova-Katkova (L. I.).] **Богданова-Катькова (Л. И.). Вредные насекомые Вологодской губернии в 1920 и 1921 годах.** [Injurious Insects in the Vologda Government during 1920 and 1921.]—*La Défense des Plantes*, ii, no. 2, pp. 72–76. Leningrad, May 1925.

The topography of the country is described, and a list of some 30 insect pests is given, with notes on their seasonal occurrence and food-plants.

[Gross-Geim (V.).] **Гросс-Гейм (В.). К познанию личинок рода *Rhynchites* Schneider.** [Notes on the Larvae of the Genus *Rhynchites*, Schneider.]—*La Défense des Plantes*, ii, no. 2, pp. 76–78, 4 figs. Leningrad, May 1925.

A key is given for the identification of the full-grown larvae of *Rhynchites pauxillus*, Germ., *R. bacchus*, L., *R. aequatus*, L., *R. auratus*, Scop., and *Byctiscus betulae*, L. (*R. betuleti*, F.). *R. pauxillus* and *B. betulae* feed on the leaves and the others on the fruit of various trees, whilst the full-grown larvae of all five weevils occur in garden soil in the Kiev Government.

[Stark (V. N.).] **Старк (В. Н.). К типологии короедных очагов хвойных лесов Карагижско-Крыловской Лесной Дачи, Брянской губернии.** [The Types of Bark-beetle Foci of the Conifer Forests of the Karagizh-Krylov Forest Estate, Briansk Government.]—*La Défense des Plantes*, ii, no. 2, pp. 78–81. Leningrad, May 1925.

The importance of studying the various types of foci from which bark-beetle infestation may arise is pointed out. These foci are discussed under two headings, permanent and periodical, which are each subdivided into various types. The factors influencing their formation are divided into two main groups, the primary factors, which include anything that will weaken or kill quite healthy trees, and the secondary factors, including anything that will complete the work of the primary factors. Certain beetles, such as *Ips typographus*, *Myelophilus minor* and *Polygraphus poligraphus* (*pubescens*) may themselves become primary factors, as they are able to attack healthy trees; whereas many species, including *P*[*ithorophloeus*] *spinulosus*, *Crypturgus pusillus* and *C. cinereus* can never become primary factors. Some external factor, climatic, cultural or other, is essential to provide the stimulus to produce a focus of infestation. Though it is very important to control any local outbreak of bark-beetles, the need for the application of correct forestry methods must not be overlooked. These require a sound knowledge of the different types of foci of infestation already referred to, each of which produces a different fauna as well as affecting its relative abundance. Thus, for example, forest fires, including fallen trees but no extensive burning of the stumps, result in the appearance in large numbers of *Myelophilus minor*, *M. piniperda*, *Ips typographus*, *Pityogenes chalcographus*, *P. bidentatus* (*bidens*) and others of less importance; *Polygraphus poligraphus* does not, however, occur in great numbers. In the case of extensive burning of stumps in the burnt area *M. piniperda* and *I. typographus* are absent, whereas *M. minor*, *Pityogenes chalcographus* and *P. bidentatus* develop normally. The fallen trees without fire will produce an abundance of *Polygraphus poligraphus* in the first year. Slight burning without falling produces different results in the case of spruce and firs.

[Vasilev (I. V.).] **Васильев (И. В.). К биологии пилильщика *Emphytus tener* Fallen.** [The Biology of *E. tener*, Fall.]—*La Défense des Plantes*, ii, no. 2, pp. 81–82. Leningrad, May 1925.

Records of the food-plants of *Emphytus tener*, Fall., are contradictory, but the author considers it to be confined to species of *Rumex*. It shows a decided preference for the cultivated species, causing considerable damage to this crop. The observations here described

were made in the south-east of the Kharkov Government in 1922 and 1923. There are four generations of the sawfly in the year. The duration of the different stages varies according to climatic conditions, and is recorded as 3 to 6 days for the egg, 12 to 17 days for the larva (6 to 7 months for the hibernating larva), and 6 to 9 days for the pupa. The egg-laying period varied from 3 to 5 days in the insectary, a total of from 57 to 108 eggs being laid. They are laid on the lower surface of the leaves; the larvae remain on this surface and skeletonise the leaves. When full-grown the larvae enter the soil to a depth of about ½ inch for pupation. The two summer generations are the most injurious and may completely defoliate the plants.

The collection of *Rumex* leaves at the height of the oviposition period is recommended as a satisfactory remedial measure. Two parasites have been reared from the eggs, *Trichogramma semblidis*, Auriv., in July and September, and an undescribed species of *Telenomus* in August.

[Sakharov (N. L.).] **Сахаров (Н. Л.). Несколько слов о вредных бабочках рода *Biston* Leach.** [A few Words on the Injurious Moths of the Genus *Biston*, Leach.]—*La Défense des Plantes*, ii, no. 2, pp. 83–84. Leningrad, May 1925.

A serious outbreak of caterpillars occurred in the orchards and artificial forests of Saratov in 1921 and continued for about four years. The species concerned were *Biston hirtaria*, Cl., *B. hispidaria*, F., *B. pomonaria*, Hb., *Phigalia pedaria*, F., *Anisopteryx aescularia*, Schiff., and *Exaereta ulmi*, Schiff. As a result of this attack and its influence on the trees, the bark-beetles, *Scolytus* (*Eccoptogaster*) *intricatus*, Koch, *S. scolytus*, F., and (in the orchards) *S. mali*, Bechst., also became more abundant. During 1924 the infestation apparently subsided as the result of a bacterial disease. During the infestation it was noticed that if one species disappeared, one of the others nearly always became more abundant, and the disappearing species was frequently found in a fresh locality. The species of *Biston* have one generation a year. The adults emerge from hibernating pupae at very low temperatures: that of the soil surface was only 1·8° C. [35·2° F.], and the air 8° to 12° C. [46·4°–53·6° F.]. The adults of *A. aescularia* emerge at even lower temperatures, the soil being only 0·7° C. [33·2° F.], the air 1·4° C. [34·1° F.]. The larval stage lasts from 30 to 55 days, pupation occurring in June and early July. Spraying with Paris green at the rate of 1 lb. to 3 lb. lime and 3 gals. water is recommended. At the author's instigation a forest of 270 acres was sprayed, this being apparently the first time a forest has been sprayed on such a large scale in Russia.

[Pliginski (V.).] **Плигинский (В.). Одна из причин массового появления озимой совки в Курской губернии в 1924 г.** [One of the Reasons for the great Abundance of *Euxoa segetum*, Schiff., in the Kursk Government in 1924.]—*La Défense des Plantes*, ii, no. 2, pp. 114–117. Leningrad, May 1925.

The destruction of weeds in the beet fields is considered to be one of the chief reasons for the unusual abundance of *Euxoa segetum*, Schiff., in the Kursk Government during 1924. The infestation in all cases was less severe in the more neglected fields. Under local

conditions the convolvulus is the weed that increases infestation, as the eggs are laid exclusively on this plant and the larvae are able to complete their development on it. The cleaner the field is of other weeds the more abundant does convolvulus become, and the more the infestation increases.

[Pliginski (V.).] **Плигинский (В.). Скелетирующая фаза гусеницы озимой совки.** [The Skeletonising Phase of *Euxoa segetum*, Schiff.].—*La Défense des Plantes*, ii, no. 2, p. 117. Leningrad, May 1925.

During investigations for the control of *Euxoa segetum*, Schiff., in the Kursk Government in 1924 it was found that, contrary to most observations by previous authors, the larvae of the first (autumn) generation, instead of directly entering the soil from the convolvulus after hatching, construct a small tube-like case in which they remain attached to the lower surface of the leaf, feeding on the latter and skeletonising it. The brownish-yellow patches of the attacked leaves are easily seen, and form a reliable guide to the extent of the infestation. This characteristic phase is apparently essential to the life-history of this generation of *E. segetum*.

[Tarbinski (S.).] **Тарбинский (С.). Новый случай нахождения *Tachycines asynamorus* Adel. (Orthoptera, Tettigoniidae) в Европейской России.** [A New Record of *T. asynamorus*, Adel., in European Russia.]—*La Défense des Plantes*, ii, no. 2, pp. 117–118. Leningrad, May 1925.

Tachycines asynamorus, Adel., is recorded from the Government of Viatka, one of the individuals being taken in a pine forest. The species has previously been recorded from unheated greenhouses, but the present record raises the possibility of it occurring in nature.

[Novik (L. A.).] **Новик (Л. А.). Шведская муха (*Oscinella frit* L.).—Бюлл. Сортов.-Семен. Упр. Сахаротреста, 1923**, no. 7, pp. 125–135, 4 figs. Kiev, 1924. (Abstract in *La Défense des Plantes*, ii, no. 2, p. 121. Leningrad, May 1925.)

The biology of *Oscinella frit*, L., has been studied under natural and artificial conditions in the Ukraine. In the latter the adults emerged from the cocoons after periods of time varying according to the temperature from 13 days at 14° C. [57° F.] to 7 days at 30° C. [86° F.]. Temperatures of 36° C. [96·8 °F.] proved fatal to the pupae. In discussing remedial measures early spring sowing and the protection of the seed against infection by smut are recommended. There appears to be a direct relation between the amount of this fungus and the abundance of *O. frit*, the possibility of the fly acting as a transmitter of the infection being suggested. The characteristics of resistant varieties of oats, barley, etc., are discussed.

[Korab (I. I.).] **Кораб (И. И.). Наблюдения над шведской и гессенской мухами** (*Oscinella frit* **L.,** *Phytophaga destructor* **Say**) **в 1923 году на Белоцерковской сортоводной станции Киевской губ.** [Observations on *Oscinella frit*, L., and *Mayetiola destructor*, Say, in the Kiev Government during 1923.]—**Бюлл. Сортов.-Семен. Упр. Сахаротреста, 1923,** no. 7, pp. 136–142. Kiev, 1924. (Abstract in *La Défense des Plantes*, ii, no. 2, p. 121. Leningrad, May 1925.)

During 1923 *Oscinella frit*, L., produced three generations in the Government of Kiev. In some cases, when *Mayetiola destructor*, Say, had caused the death of the first nodes of wheat, second nodes were formed, which developed normally and were not attacked. This phenomenon only occurred when the seed was deeper than about 1½ inches; plants from the more superficial seeds failed to react in this manner and died.

[Dovnar-Zapolski (D. P.).] **Довнар-Запольский (Д. П.). Краткий определитель личинок обычных саранчевых.** [A brief Key to the Larvae of the more common Locusts.]—**Труд. С.Х. Опытных Учреждений Дона и Сев. Кавказа. Ростово-Нахичеван. на Д. Областн с.х. Опытная Станция,** Bull. 177, 11 pp. 1924. (Abstract in *La Défense des Plantes*, ii, no. 2, p. 123. Leningrad, May 1925.)

This key to the common locusts of the northern Caucasus includes 11 genera; but only a limited number can be identified down to the species. For the most part structural characteristics have been used. In some cases the various stages of the larvae are described.

[Vodolagin (V.).] **Водолагин (В.). Капустный клоп и меры борьбы с ним.** [*Eurydema ornatum*, L., and its Control.]—**Астраханск. Станц. Защиты Раст. от Вредит.** [*Astrakhan Sta. Plant Prot.*], Leaflet 54, 4 pp. Astrakhan, July 1925.

The remedial measures recommended against *Eurydema ornatum*, L., attacking cabbage and other crucifers, are hand collection of eggs and spraying with soap solution, tobacco extract or kerosene emulsion. The preparation of the sprays is described.

[Predtetchenski (S.).] **Предтеченский (С.). Капустная моль.** [The Cabbage Moth.] *Plutella maculipennis*, **Curt.**—**Астраханск. Ста. Защиты Раст. от Вредит.** [*Astrakhan Sta. Plant Prot.*], Leaflet 55, 3 pp., 2 figs. Astrakhan, July 1925.

The young larvae of *Plutella maculipennis*, Curt., may be destroyed by thorough wetting with soap solution, but against the more mature ones Paris green should be used. The preparation of both sprays is described.

[Filipev (I. N.).] **Филипьев (И. Н.). Озимая совка в 1924 г.** [*Euxoa segetum* in 1924.]—**Извест. Энт. и Фитопатолог. Бюро Уральск. О-ва Любит. Естествозн.** [*Bull. Ent. & Phytopath. Bur. Ural Soc. Nat.*], 1925, no. 3, pp. 8–9. Sverdlovsk, May 1925.

As a result of questionnaires the local distribution of *Euxoa segetum* in European Russia has been outlined. The injury was generally most

severe to winter-sown crops in 1924. There was a marked preference shown for light, well-cultivated soils, and for rye as compared with wheat. In some localities the pest was completely controlled by birds. As many as 65 to 90 per cent. of the hibernated larvae are destroyed by bacterial diseases. With the advent of frosts the larvae fed on the soil surface during the day, as though instinctively seeking to hasten their development so as to hibernate as full-grown larvae. As a rule immature larvae do not hibernate, though instances of this have been recorded.

[Nasurov (K. S.).] **Насуров (К. С.). Итоги борьбы с кобылкой в Челябинском Округе в 1924 году.** [Anti-locust Measures in the Tcheliabinsk Region in 1924.]—**Извест. Энт. и Фитопатолог. Бюро Уральск. О-ва Любит. Естествозн.** [*Bull. Ent. & Phytopath. Bur. Ural Soc. Nat.*], 1925, no. 3, pp. 9–10. Sverdlovsk, May 1925.

The organisation of anti-locust measures during 1924 is described. The first records of the hatching of *Gomphocerus sibiricus*, L., and *Arcyptera flavicosta*, Fisch., were received in the beginning of May. In all, 13,789 acres were treated with the usual poison baits, and on the average about 92 per cent. of the locusts were killed.

[Kolosov (Yu.).] **Колосов (Ю.). Грибная болезнь кобылки, наблюдавшаяся на Южном Урале.** [A Fungous Disease of Locusts observed in the Southern Ural.]—**Извест. Энт. и Фитопатолог. Бюро Уральск. О-ва Любит. Естествозн.** [*Bull. Ent. & Phytopath. Bur. Ural Soc. Nat.*], 1925, no. 2, p. 5. Sverdlovsk, April 1925.

During 1924 *Podisma pedestris*, L., was attacked in large numbers by the fungus *Empusa grylli*. Attempts to produce a pure culture of the fungus were negative.

Mordvilko (A. K.). **From the History of some Groups of Aphids.**—*C.R. Acad. Sci. Russie*, 1924, pp. 46–49. [Leningrad, 1924.] [Received 7th September 1925.]

This is an English version of a paper already noticed [*R.A.E.*, A, xii, 358] discussing the history of Aphids from fossil times to the present day, and the evolution of certain species.

Mordvilko (A. K.). **Aphids with Incomplete Cycles of Generations and their Origin.**—*C.R. Acad. Sci. Russie*, 1924, pp. 50–53. [Leningrad, 1924.] [Received 7th September 1925.]

Further instances are given of Aphids in which only parthenogenetic reproduction occurs (anholocyclic forms) [*cf. R.A.E.*, A, xi, 564]. Once the anholocyclic form has been evolved, owing to the disappearance of the primary food-plant, the winged sexuparae are no longer produced, and the form cannot change back into the holocyclic form even if the primary food-plant once more becomes available. Some species

exhibit parallel cycles, complete (holocyclic) and incomplete, the latter only on intermediate food-plants. These include a number of PEMPHIGINAE, *Anoecia corni*, F., the genera *Hormaphis* and *Asterogopteryx*, and nearly all the CHERMESINAE. *Thecabius affinis*, Kalt., for instance, occurs in the anholocyclic form on *Ranunculus* in Finland and the Government of Leningrad, but in the latter region, since the introduction of *Populus suaveolens* and *P. nigra*, the holocyclic forms have also appeared. Anholocyclic forms were found by Börner near Metz and named by him *T. agnotus*, but as these forms do not differ morphologically from the typical one, it would be more correct to name them *T. affinis* forma anholocyclica. Similar cases probably occur in different species of *Forda*, *Hormaphis* and others, but as the exules in the holocyclic forms are not yet known, it is impossible to say which holocyclic and anholocyclic forms correspond.

MORDVILKO (A. K.). **Anholocyclic Aphids and the Glacial Epoch. Anholocyclic Uredinales.**—*C.R. Acad. Sci. Russie*, 1924, pp. 54–56. [Leningrad, 1924.] [Received 7th September 1925.]

In many of the temperate regions series of plants died out during the glacial epoch. Aphids with a single food-plant must have died out with the extinction of the plant, but if the extinct plants were the primary food-plants, the Aphids were able to survive as anholocyclic forms on the secondary ones. In exceptional cases (some CHERMESINAE) the secondary food-plants have become extinct, and the Aphids survived on the primary ones. It is concluded that most anholocyclic forms have only propagated parthenogenetically from the beginning of the glacial period; some tropical genera, however, may have reproduced in this manner from the tertiary period and have therefore had time to produce new species and even new genera. The anholocyclic forms arising during the glacial period have not had time to develop noticeable morphological changes as compared with the original holocyclic forms.

Analogous conditions occur in heteroecious rust-fungi (Uredinales).

MORDVILKO (A. K.). **Cases of Heteroecy in the Plant Lice resulting from Primary Polyphagy.**—*C.R. Acad. Sci. Russie*, 1924, pp. 161–162. [Leningrad, 1924.] [Received 7th September 1925.]

In 1907–1909 the author advanced the hypothesis that the migration of Aphids is a result of specialisation of their original polyphagous habits, some of the polyphagous species becoming monophagous ones, and others migrants. The latter process occurred chiefly in the case of species developing equally well on woody or on weedy plants or even roots. In temperate climates the woody plants do not supply sufficient food for the reproduction of the Aphids during the summer, whereas the weedy plants do. On the other hand the hibernating eggs laid in the autumn are better preserved on woody plants. This theory, however, requires that both the primary and secondary food-plants should be present at the time of the evolution of the migrating species, and though this is possible, particularly with regard to certain groups of Aphids, the author now considers that the majority of migrating forms have arisen in another way [*cf. R.A.E.*, A, xiii, 105].

v. Butovitsch (V.). **Die Winterverstecke des grossen Waldgärtners** (*Blastophagus piniperda* **L.).** [The Winter Hiding Places of *Myelophilus piniperda*, L.]—*Internat. Ent. Zeitschr.*, xix, no. 6, pp. 34–35. Guben, 8th May 1925.

It is generally accepted that *Myelophilus* (*Blastophagus*) *piniperda*, L., bores into the thick bark of old pine trees at the beginning of the winter. These tunnels are described for comparison with other winter quarters here discussed. Winter-feeding in young trees has not been previously recorded, though it is by no means exceptional in Germany. The usual place of attack is the lowest part of the tree, up to a height of about 8 inches or more. The galleries extend through the bark and partly into the bast. A third type of winter quarters was also found, the beetles passing the winter actually in the shoots in the crown of the tree. Only a small number of beetles choose these quarters; they are probably late developing individuals that only entered the shoots in August and had not completed their feeding there at the onset of the cold weather. Overwintering in shoots in the ground is less frequent, and probably only occurs in shoots that have been blown down during the winter.

According to v. Fürst-Kauschinger the beetles spend the winter in cracks in the bark and under moss, but the author failed to find them in these positions in February, November or December 1924.

As regards the importance of this winter feeding, the actual damage to young pole-wood trees cannot at present be estimated in figures, but even in the case of moderate infestation the trunk may be girdled and killed. The majority of beetles, however, attack the older trees.

Seitner (M.) & Nötzl (P.). *Pityophthorus henscheli* **Seitner und sein Parasit** *Cosmophorus henscheli* **Ruschka.** [*P. henscheli* and its Parasite, *C. henscheli*.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 187–196, 1 pl. Berlin, July 1925.

The life-histories of Braconids of the genus *Cosmophorus* have not been studied. Their larvae are internal parasites of adult bark-beetles and occur more frequently than has been thought. Quite recently a new species has been found by Ruschka in *Pteleobius vittatus*, F., while the senior author has discovered two new ones, *Cosmophorus henscheli*, Ruschka, in *Pityophthorus henscheli*, Seitner, and *C. cembrae*, Ruschka, in *Pityogenes bistridentatus*, Eichh., and *P. quadridens*, Hrtg. [see next paper]. In 1924 in Tyrol 37 per cent. of the mature adults of *P. henscheli* were parasitised. The host beetle occurs in old Cembra pines [*Pinus cembra*] and also in dwarf mountain pines [*P. pumilio*] in the lower branches that are dying naturally. *C. henscheli* hibernates in the first or second larval stages in the beetle. Owing to this difference in the age of the hibernating larvae the flight-period of the adults covers several weeks, with a maximum at the end of May. The adult deposits its egg in the thorax of the beetle, which is thereby paralysed for a short time. The egg and three larval stages of the parasite are described. It can reproduce parthenogenetically. Oviposition takes place chiefly in May and June, and the parasitised beetle lives up to the following spring, remaining active until shortly prior to its death, which apparently occurs when the parasite reaches the third larval stage. The larva then emerges and pupates in a web close to

the host. The Braconid has thus one generation a year. From a series of examinations it is considered to be proved that parasitised female beetles either fail to oviposit or do so to a limited degree only.

RUSCHKA (F.). **Beitrag zur Kenntnis der forstlichen Braconiden.** [A Contribution to the Knowledge of Forest Braconids.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 197–202, 1 fig. Berlin, July 1925.

A short historical note on the Braconid genus *Cosmophorus*, the species of which are parasites of adult beetles, is followed by a re-description of *C. klugi*, Ratz., more exact than the original one, from 3 females bred from *Polygraphus poligraphus*, L., from Styria. The new species described are *C. henscheli*, from *Pityophthorus henscheli*, Seitner, and *C. cembrae*, from *Pityogenes bistridentatus*, Eichh., both from Cembra pines [*Pinus cembra*] from Tyrol.

Dendrosoter caenopachoides, sp. n., is described as a parasite of *Pityogenes lipperti*, Henschel, from *Pinus halepensis* in Dalmatia.

MEYER (N. F.). **Zur Biologie und Morphologie von *Pimpla examinator*, Fabr. (Hymenoptera, Ichneumonidae).** [A Contribution to the Biology and Morphology of *P. examinator*.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 202–212, 12 figs. Berlin, July 1925.

The Ichneumonid, *Pimpla examinator*, F., is one of the most polyphagous species of its family, its hosts (as recorded in the literature or observed by the author) being the pupae of numerous Lepidoptera. Brischke's statement that it parasitises the larvae of a weevil, *Anthonomus pomorum*, L., needs confirmation. It occurs throughout western Europe, in European Russia, Transcaucasia and western Siberia. It does not reproduce rapidly enough to be of much economic value; one female laid 46 eggs and another 51, so that Schmiedeknecht's ranking of it with the highly fertile Braconid genera, *Apanteles* and *Microgaster*, is incomprehensible. On an average the egg stage lasts 2 days, the larval stage 20, and the pupal stage 4–6. All stages are described.

JUCHT (—). **Ein Beitrag zur Kiefernspannerfrage.** [A Contribution to the Question of the Pine Geometrid.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 213–245. Berlin, July 1925.

A number of observations, made during the outbreak of the pine Geometrid [*Bupalus piniarius*, L.] near Ingolstadt, Bavaria, in 1912–1914, are recorded. Males predominate by day, but it may be taken that the presence of many males implies that of a corresponding number of females. For the estimation of the amount of increase from one generation to another, counts of the eggs or larvae do not give satisfactory data. The easiest and most certain indication is provided by observing the abundance of the pupae.

Parasitic insects were not of any importance in checking *B. piniarius*. Ants did not attack the pupae, but destroyed some of the newly-emerged adults. Birds are not of much value, but mice devour large numbers of the pupae. Weather conditions may prove useful by preventing the larvae from feeding. The only remedial measure considered to be of practical value is directed against the pupae, and consists in removing the ground litter or gathering it into heaps. The

heat generated within the heaps destroys many of the pupae, and the emerging adults cannot escape if the covering is 4 inches thick, whereas Ichneumonid and Tachinid parasites can make their way through 12 inches.

Vietinghoff von Riesch (A. Frhr. von). **Das Verhalten paläarktischer Vögel gegenüber den wichtigeren forstschädlichen Insekten. Biozönologische Studien.** [The Behaviour of Palaearctic Birds towards the more important Insect Pests of Forests.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 247–254. Berlin, July 1925.

This paper, the contents of which are indicated by its title, is one of a series of studies [*R.A.E.*, A, xii, 574] and deals with the pine moth, *Panolis flammea*, Schiff. (*piniperda*, Pz.).

Lommel (V.). **Ueber tierische Schädlinge der Kokospalme.** [On Animal Pests of the Coconut Palm.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 255–272, 2 figs. Berlin, July 1925.

The observations recorded here were made near Quilimane, Portuguese East Africa, from 1920 to 1922, in extensive coconut plantations on the coast.

Oryctes monoceros, Ol., is the most widely distributed rhinoceros beetle. *O. boas*, F., is almost equally important, while *O. cristatus*, Snell., is collected occasionally. A few other species of the genus are also present. It is improbable that these beetles, especially *O. monoceros* and *O. boas*, vary in their method of attack, but it was curious that in a plantation of about 3,000 acres close to the beach quite young palms (even those without a trunk) were most attacked, whereas in plantations about 4 hours' walk inland the old palms were preferred. While collection of the adults should not be neglected, it is chiefly the larvae that should be searched for and destroyed. The dung-heaps near cattle-sheds were always heavily infested, while decaying trunks of coconut and other palms were even more densely populated. Observations of the condition of some coconut palms that had been sprayed some years before with Bordeaux mixture cause the author to suggest that a spray of this solution or of lime-sulphur may perhaps have a repellent action.

Coconut weevils are also quite common. At the plantation close to the beach mentioned above *Rhynchophorus phoenicis*, F., was chiefly responsible for the death of healthy palms. Only in exceptional cases were infested palms able to survive, and these are held to be due to the beneficial action of ants and termites. This weevil occurs in various wild palms throughout the district. It was also noticed in a plantation of oil palms, *Elaeis guineënsis*, about 150 miles inland. An effective measure near the sea shore is to throw infested stems into salt-water creeks. If infested trunks are burnt, they must be split up, otherwise the external portions are charred and the larvae remain alive in the interior. When a tree is felled the stump is usually left. Such stumps are dangerous breeding-places, but may be used as traps as they attract the adults and the larvae in them can be destroyed in quantities. The larval stage lasts 44 to 46 days, and the pupal 26 to 33, or, rarely, 37 days.

Rhina amplicollis, Grst., is another weevil that is distributed throughout the district and causes considerable injury in places. The entrance-holes of the larvae may be seen over the whole trunk. They are

1–2 mm. in diameter, whereas the mines have a diameter of 1–1½ cm., and the exit-holes of the adults are about 1 cm. in diameter. The larva pupates without a cocoon or with only a very rudimentary one, and so is much exposed to ants and termites. If the mines are numerous the interior of the trunk may be hollowed out. The measures advised for *R. phoenicis* are suitable against this pest also. In a plantation where the palms had had a 2-inch hole bored through each trunk there were no traces of this weevil, and this may be due to the easier access afforded to ants and termites.

A Cetoniid, *Pachnoda euparypha*, Grst., is generally distributed in the coconut plantations. The larvae live with those of *Oryctes* in the decaying portions of dead palms. It has been considered quite harmless, but the author has occasionally found it in recently dead palms without any decayed portions, in which development must have occurred when the palms were still alive. In any case, however, it is present only in company with *Oryctes* and *Rhynchophorus*, and does not infest healthy palms.

MARTINI (E.). **Ueber die Wärmesummenregel.** [On Formulae for Temperature Effects.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 301–305, 2 curves. Berlin, July 1925.

The author briefly criticises certain details in Bodenheimer's paper [*R.A.E.*, B, xiii, 33] and discusses Blunck's corrected formula for indicating the effect of temperature on insect development. After describing other forms of curves and formulae that may be used, he concludes that Blunck's improvement represents a great advance, as has been confirmed by Bodenheimer [*R.A.E.*, A, xiii, 389], and is suitable for most practical workers.

VIETINGHOFF VON RIESCH (A. Frhr. von). **Magenanalysen heimischer Vögel als Bausteine zur Erkenntnis des Verhältnisses zwischen Vogel und Insekt.** [Stomach Analyses of German Birds as a Basis for the Determination of the Relation between Bird and Insect.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 309–312. Berlin, July 1925.

This is a list of 35 examinations of the stomachs of various birds found in Germany.

VIETINGHOFF VON RIESCH (A. Frhr. von). **Beobachtungen an *Luperus pinicola* Duft.** [Observations on *L. pinicola*.]—*Zeitschr. angew. Ent.*, xi, no. 2, pp. 312–314. Berlin, July 1925.

The pine-leaf beetle, *Luperus pinicola*, Duft., is not of great importance, though occasionally its attack may weaken pines, especially when associated with other unfavourable influences. In the author's opinion it is a secondary pest, only infesting pines with backward growth. In 1924 it was observed on pines from 2 to 6 feet high. One individual can destroy a number of needles in a few minutes, as it feeds at the base of the leaf. As it is very sensitive to touch; isolated trees are more favourable to it. Spiders appear to be active enemies of this beetle.

PRELL (H.). **Der Trichterwickel des Birkenblattrollers.** [The Funnel-roll of the Birch Leaf-roller.]—*Naturwissenschaften*, xiii, no. 30, pp. 652–656, 3 figs. Berlin, 24th July 1925.

The way in which the weevil, *Deporaus betulae*, L., rolls the leaves of birch is described and figured in detail.

SCHULZE (H.). **Zur Biologie des Blattwespenlarve** *Lyda clypeata* **Klug.** [Biology of the Sawfly Larva, *Neurotoma flaviventris* var. *pyri*.]—*Zool. Anz.*, lxiii, no. 1–4, pp. 13–32, 81–89, 4 figs. Leipzig, June 1925.

Nests of the larvae of *Neurotoma flaviventris*, Retz., var. *pyri*, Schr. (*Lyda clypeata*, Klug) are found on both young and old pear trees from the end of May to the end of June. The larvae, when full grown, fall to the ground, into which they make their way to a depth of about 16 inches to hibernate. It is supposed that this sawfly is attacked by parasites in the egg stage, since the larvae are almost completely protected by their webs and nests. After leaving these they are attacked by birds and various predacious insects.

VAN EMDEN (F.). **Bericht über die entomologische Ueberwachung der Speicher und Kulturen der Firma Caesar & Loretz A.-G. im Jahre 1923.** [Report on the Entomological Supervision of the Warehouses and Crops of Messrs. Caesar & Loretz in 1923.]—*Jahresbericht 1924 von Caesar & Loretz*, pp. 167–232, 4 pls. Leipzig 1925.

This report embodies data collected during visits to study the pests of the stored products and crops of the Saxon firm of medicinal plant growers named. The time devoted to the subject was necessarily inadequate in 1923, but the information obtained should form a useful basis for future studies. A general account is given of the method employed for collecting the pests, followed by notes on the insects taken in the field and in the warehouses, arranged under the plants and products affected. Indices are given of the plants attacked and the pests attacking them, as well as an extensive bibliography of 110 works dealing with the subject.

In spite of the large number of insects mentioned, none caused extensive injury to any particular crop or stored product; but many are potential pests.

The more important pests of the stored products are beetles, Pyralid moths, and mites. Of particular interest was the occurrence of *Hesperandrius* sp. (possibly *H. pallidus*, Ol., the slight differences being perhaps due to the unusual food-plant) in stored roots of rhubarb (*Rhizoma rhei*). This plant was attacked in the field by *Aphis rumicis*, L. Other pests of field crops especially mentioned are *Empoasca* (*Chlorita*) *flavescens*, F., on *Levisticum officinale*; *Eupteryx atropunctata*, Goeze, on *Salvia sclarea* and mint (*Mentha*); *Podagrica fuscicornis*, L., on *Althaea officinalis*; *Psylliodes hyoscyami*, L., and *P. affinis*, Payk., on *Atropa belladonna*; and the last-named also on *Hyoscyamus niger*.

VAN EMDEN (F.). **Insektenschädlinge in vegetabilischen Drogen im Jahre 1924.** [Insect Pests in Vegetable Drugs in 1924.]—*Anz. Schädlingsk.*, i, no. 8, pp. 89–91. Berlin, 1925.

Notes are given on some of the insect pests of vegetable drugs observed in 1924 in the warehouses of Messrs. Caesar and Loretz, a report on which, similar to that noticed above, will appear later. The imported species included a small Mycetophagid, *Berginus tamarisci*, Woll., found in the flowers of *Cereus grandiflorus* from Algiers, and forming a new record for Central Europe; the Scolytid, *Cryphalomorphus stierlini*, Egg., in the roots of *Ipomoea turpethum*, probaby from Abyssinia; and the Bostrychid, *Dinoderus distinctus*, Lesne, in the roots of *Jatrorhiza palmata*.

The Nitidulids, *Carpophilus* spp., are known as pests of dried fruits, but specimens of *C. dimidiatus*, F., were found in a half-devoured pupa of a moth, *Trachylepidia fructicassiella*, Rag., infesting fruit of *Cassia fistula*. The larvae of *Attagenus piceus*, Ol., infested the seeds of *Cnicus benedictus*.

Some observations were made on the numbers of annual generations of some warehouse pests, and it was found that *Sitodrepa panicea*, L., *Plodia interpunctella*, Hb., and *Ephestia elutella*, Hb., have 1 or 2 generations. In the case of *S. panicea* this variation even occurred in the progeny of a single pair. The development of *P. interpunctella* is very considerably hastened by a high temperature, and this difference in its behaviour from the other species is probably due to the duration of the latent, pre-pupal stage being more readily affected by temperature. The great economic importance of *P. interpunctella*, especially in warm districts, is easily explained by this facility for shortening the pre-pupal period and the possibility of having more than 2 generations a year.

EIDMANN (H.). **Der Nutzen der Ameisen.** [The Usefulness of Ants.]—*Anz. Schädlingsk.*, i, no. 8, pp. 85–89. Berlin, 1925.

A number of recorded instances of the value of ants are given. In Germany the damage done by them is considerably outweighed by their usefulness, particularly in forests, in which it has been observed that where ants are numerous serious outbreaks of pests do not occur.

NOVOPOLSKY (E.). **Zwei Obstschädiger in der Krim.** [Two Fruit Pests in the Crimea.]—*Anz. Schädlingsk.*, i, no. 8, pp. 92–94. Berlin, 1925.

The two pests dealt with here, *Recurvaria nanella*, Hb., and *Eucosma* (*Tmetocera*) *ocellana*, F., are the subject of more detailed papers in Russian [*R.A.E.*, A, xiii, 470, 471].

HESSLER (H.). **Zur Bekämpfung der Weidenschädlinge.** [Measures against Willow Pests.]—*Anz. Schädlingsk.*, i, no. 8, p. 95. Berlin, 1925.

In a willow plantation in Hesse, rows of *Salix viminalis* were infested by the Chrysomelids, *Plagiodera versicolor*, Laich., and *Melasoma populi*, L. These plants were growing on the edge of a large area of American basket willows, which were infested by the weevils, *Phyllobius*

argentatus, L., *P. oblongus*, L., and *Cryptorrhynchus lapathi*, L., and the larvae of a sawfly, *Caliroa* (*Eriocampoides*) *annulipes*, Klug. Infested plants should be uprooted in spring and burned. In another plantation the same three weevils were abundant, and spraying with 1 per cent. lead arsenate solution was advised. Though two big trees of *Tilia parvifolia* were quite close, they were not attacked.

ALFKEN (J. D.). **Die Motte** *Endrosis lacteella* **L. als Warenschädling.** [The Moth, *E. lacteella*, Schiff., as a Pest of Stores.]—*Anz. Schädlingsk.*, i, no. 8, p. 95. Berlin, 1925.

The larvae of *Endrosis lacteella*, Schiff., are recorded as destroying supplies of cabbage seed, dried peas, and rye.

SACHTLEBEN (H.). **Untersuchungen über die Nahrung des Maulwurfs.** [Investigations on the Food of the Mole.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 1, pp. 77–96. Berlin, 1925.

Examination of the stomachs of 140 moles show that insects predominate in their dietary, and that the greater portion of the insect food is made up of cockchafer larvae and wireworms, both difficult pests to combat. Moles should, therefore, be protected, unless present in excessive numbers.

WICHMANN (H.). **Die Oekologie des** *Xyloterus lineatus*. [The Ecology of *X. lineatus*.]—*Anz. Akad. Wiss. Wien*, 1925, p. 52. (Abstract in *Neuheiten auf d. Gebiete d. Pflanzenschutzes*, 1925, no. 2, p. 24. Vienna, 1925.)

The Scolytid, *Xyloterus lineatus*, Oliv., breeds in various Abietineae in Austria. The adults and larvae feed chiefly on ambrosial fungi, which are aerobic, so that the mines have to be kept free from obstacles to the entrance of air.

PAILLOT (A.). **Sur la grasserie du Ver à soie.**—*C.R. hebdom. Acad. Sci.*, clxxxi, no. 8, pp. 306–308. Paris, 1925.

Further observations [*R.A.E.*, A, xii, 454] on "grasserie" in silkworms confirm the fact that the disease is hereditary and that the parasite is intracellular. The body fluid of silkworms denuded of polyhedral bodies by centrifugation, then dried on linen and kept exposed to the air, is capable of infecting fresh larvae the next year by inoculation. On the other hand, polyhedral bodies that have been washed lose their virus, this fact disproving the theory that the polyhedral corpuscles are cysts filled with parasites.

The danger of infection may be minimised by using for breeding only cocoons among which the percentage of mortality is low; destroying at once any young larvae destined for breeding that show signs of disease; keeping the breeding rooms well aired and cool; moving the larvae by the use of perforated paper, or other similar means, rather than by hand; and keeping the larvae well separated on the trays.

LEES (A. H.). **Egg-killing Washes.**—*Ann. Rept. Agric. & Hortic. Res. Sta.*, 1924, pp. 51–60. Bristol, 1925.

This paper describes the results of a third season's trials of the results of various egg-killing washes [*cf. R.A.E.*, A, xi, 538; xii, 252], special attention being given to the tar-distillate washes. As it was impossible to obtain sufficiently exact data by any field trial, experiments were started with eggs of *Aphis pomi* on apple stocks in pots, the eggs being kept under an outside environment until hatching began. Lime-sulphur, even at a strength of 1 : 15, with or without calcium caseinate, failed to show definite egg-killing power. Proprietary tar distillate washes (carbo fluids) gave generally good results, and the method of testing is accurate enough to show the effect of a difference of 2 per cent. in the strength of the wash, which cannot be observed in field trials. Until further trials are made it is impossible to state whether the early or late spray is more effective, owing to the apparent difference of viability of the eggs in the two series. Commercial cresylic acid, whether made up with soap as a wet spray or with dry carriers as a dust, failed to show definite toxic effects, even when used in a spray at a strength of 8 per cent., whereas in the previous season's trials 2½ per cent. showed good results. The only difference between the two trials was that in the first the cresylic acid was loosely held in combination in the emulsion, and in the second firmly, and it is possible that in this case the soap diminished the action of an otherwise toxic body.

LEES (A. H.) & BRITON-JONES (H. R.). **Plum Aphis and Brown Rot Control.**—*Ann. Rept. Agric. & Hortic. Res. Sta.*, 1924, pp. 61–65. Bristol, 1925.

Experiments carried out to test the efficacy of various sprays against Aphids, brown rot, and larvae of the winter moth [*Cheimatobia brumata*] on plum trees showed that none of the materials used completely controlled them all. Lime-sulphur (1 in 15 and 1 in 30) applied in March partially controlled all three pests, but the benefit derived was not sufficient to justify recommending its use. Nothing seemed to be gained by adding either nicotine or paraffin to caustic soda and soft soap solution. All three were highly satisfactory against the Aphids and winter moth, but their action on brown rot was slight. The effectiveness of these washes may have been due to the fact that they were applied in April, later in the season than the other sprays, and killed newly hatched insects.

A 7 per cent. solution of tar distillate (carbo fluid) applied on 31st January completely controlled Aphids and brown rot and was fairly effective against the winter moth. A 4 per cent. solution gave somewhat similar results, but was not quite so successful against brown rot. The most satisfactory method of dealing with these three pests is probably to spray with carbo fluid and apply grease bands to the tree-trunks. As carbo fluid is applied when the tree is dormant and when such inter-crops as black currants or gooseberries are also dormant, there is no danger of any damage to the latter. The caustic washes are applied later when the plum buds are about to open, at which time there is danger of damage to the inter-crops, which are then in leaf.

Lees (A. H.) & Staniland (L. N.). **Progress Report on Red Plant of Strawberries.**—*Ann. Rept. Agric. & Hortic. Res. Sta.*, 1924, pp. 66–69. Bristol, 1925.

It has been suggested that "red plant" and "cauliflower disease" in strawberries are caused by different types of reaction to infestation by *Aphelenchus fragariae*, R.-B. [*R.A.E.*, A, xi, 539]. In the summer and autumn of 1924, however, this Nematode was found in comparatively large numbers in normal plants, where there was no sign whatever of any resemblance to typical red plant. It was observed that in those areas of a strawberry field where there is much waterlogging, red plant is more noticeable; and a preliminary experiment was carried out to ascertain the possible effect of rain on the number of Nematodes present in a plant. As experiments indicate that the Nematodes may be washed out of the plants by rain at any time of year, it would seem that the rate of reproduction must be sufficiently high to allow for their continuous presence on the plant despite washing out. It is probable, however, that breeding slackens towards the winter, since fewer Nematodes are found in the leaf bases. For an explanation of the different manifestations of the disease, other factors must be investigated; the authors still accept the presence of Nematodes as a necessary hypothesis for the moment, but suggest that their presence alone is not sufficient.

Lees (A. H.). **Experiments on the Control of Willow Beetles.**—*Ann. Rept. Agric. & Hortic. Res. Sta.*, 1924, pp. 120–122. Bristol, 1925.

Laboratory experiments were started in the winter of 1924 in order to find some means of combating species of *Phyllodecta* and *Galerucella*, which for many years have been prevalent in the willow-growing regions of Somerset. These beetles cause extensive damage to the rods both in the larval and adult stages, large quantities of leaf tissue being devoured. *P. vitellinae* was the species against which laboratory experiments were made. Red oil, which emulsifies in dilute sodium carbonate, and which has given good results experimentally against *Anthonomus pomorum*, failed even at a 5 per cent. strength against *P. vitellinae*. Even a 10 per cent. paraffin-calcium caseinate emulsion was not very effective. Experiments with soap and nicotine with or without paraffin indicated that the addition of paraffin made no difference. Various strengths of nicotine were tried, but 8 oz. per 100 gals. only killed 32 per cent., the beetles apparently recovering owing to the volatility of the nicotine. Accordingly nicotine sulphate was substituted for nicotine in equivalent quantities (20 oz. nicotine sulphate = 8 oz. nicotine), and at 30 oz. to 100 gals. a 100 per cent. kill was obtained. A lead arsenate spray, 8 lb. powder per 100 gals., killed 32 per cent. of the beetles. The spray did not spread well, and the beetles avoided the sprayed patches. The addition of 1 per cent. casein spreader, however, caused 74 per cent. mortality. A 10 per cent. and 20 per cent. lead arsenate powder and lime dust were also tried, both being equally effective but inferior to the liquid form.

Field trials failed to indicate the efficacy of the treatments as insecticides, as very little damage by beetles occurred on the controls. The lead arsenate spray with the casein spreader adhered very well and is evidently almost proof against rain when once dry. The dust remained fairly well, but not sufficiently so to prove effective.

E. C. **A new Method of Cyaniding.**—*Gardeners' Chron.*, lxxviii, no. 2014, pp. 93–94. London, 1st August 1925.

Fumigation of greenhouses with calcium cyanide is cheap, safe and reliable. To obtain the best results the air in the house to be treated should be fairly moist, 55–80 per cent. humidity, and the temperature between 55° and 75° F. A calm evening or a dull morning should be chosen. The calcium cyanide should be dusted evenly on the path. At ¼ oz. per 100 cu. ft. it will kill all Aphids, and the adults and larvae of whitefly [*Trialeurodes vaporariorum*] and other soft-bodied insects.

Jablonowski (J.). **Locusts in Hungary during 1924.**—*Internat. Rev. Sci. & Pract. Agric.*, N.S. iii, no. 2, pp. 468–482. Rome, April-June 1925.

The locust invasion in Hungary in 1924 was a continuation of that in 1923 [*R.A.E.*, A, xii, 429]. *Calliptamus italicus*, L., appeared, as usual, earlier than *Dociostaurus maroccanus*, Thunb. Locusts were scarce or absent in districts where in the previous year scientific measures had been applied or where the fungus, *Empusa grylli*, had occurred, but the effects of the latter are entirely local. In 1924 infection by *E. grylli* was considerably more severe and developed in the locusts before the eggs were laid. Lucerne fields of four years' growth or more suffered more severely from *C. italicus* than areas where the growth of herbage was lower or less close. In the case of *D. maroccanus* it was observed that any retardation in one stage of its development is compensated for by more rapid development in other stages.

The fact that *C. italicus* for over 40 years has always first appeared near the Matra mountains and on the river Tisza, and always abounds in these two areas, points to their being the real centres of infestation. On the other hand, *D. maroccanus* has no permanent centres in Hungary, where its appearance is of more recent date, the first destructive invasion having occurred in 1899.

Orphania denticauda, Charp., and *Locusta migratoria* ph. *danica*, L., appeared in the same localitites as in 1923.

Several species of *Chelidoptera* occur in Hungary, but usually remain harmless, though they occasionally appear in wheat and barley fields after the harvest and find a lodging in the sheaves, where they devour the grain in the ear. In 1924, however, the nymphs and larvae of *Chelidoptera albopunctata*, Goeze, attacked young cereals, especially wheat and barley, eating the grains in the milky stage and causing serious damage. This was due to the cattle on the pastures gradually forcing the grasshoppers on to the crops.

Locusts in the Colony of Eritrea and in Italian Somaliland. (Reports transmitted to the International Institute of Agriculture by the Italian Colonial Minister.)—*Internat. Rev. Sci. & Pract. Agric.*, N.S. iii, no. 2, pp. 483–484. Rome, April-June 1925.

During 1924 no flights of locusts occurred in Eritrea. Only in the valley of Barca some local, non-migrating species multiplied excessively. *Tryxalis variabilis* was the most numerous and caused slight injury to the durra crops [*Sorghum*]. The experience of past years shows that the colony is subject to invasions from the south and south-east, coming from the Sudan, and that the coast region from Zula-Sahel to the Sudanese frontier is a zone of winter reproduction.

The last noteworthy invasion of locusts in Italian Somaliland took place in 1913. This invasion and others in 1905 and 1912 came from Abyssinia. The local species of locusts are non-migratory and do little harm.

Control of the Olive Fly (*Dacus oleae*) **in Turkey. (Communicated by the Turkish Ministry of Agriculture to the International Institute of Agriculture.)**—*Internat. Rev. Sci. & Pract. Agric.*, N.S. iii, no. 2, pp. 484–485. Rome, April-June 1925.

In 1924 a bait-spray of sodium arsenate, molasses and water was applied in May in many districts of Turkey against the olive fly, *Dacus oleae*. The results were satisfactory, 80 per cent. of the olives being healthy and of normal size.

Voukassovitch (P.). **Observations biologiques sur quelques parasites des Pucerons du Rosier et leurs hyper-parasites.**—*C.R. Soc. Biol.*, xciii, no. 27, pp. 655–656. Paris, 14th August 1925.

Besides *Isobremia kiefferi*, Vouk. [*R.A.E.*, A, xiii, 150], *Aphidius rosae*, Hal., and in one or two instances a species of *Praon* were the only parasites found attacking the rose Aphids near Belgrade in 1924. *A. rosae* is in turn parasitised by the Proctotrupid, *Lygocerus testaceimanus*, Kieff., and the Chalcids, *Allotria victrix*, Westw., *Pachyneuron aphidis*, Bch., and *Asaphes vulgaris*, Wlk. *L. testaceimanus* was previously erroneously considered a primary parasite of *Macrosiphum* (*Aphis*) *rosae*. In the present observations it was occasionally found as a hyperparasite of this species, and frequently on *M.* (*A.*) *sonchi*, L., parasitised by species of *Praon* or *Aphidius*. No difficulty was found in rearing this species, complete development occupying from 14 to 16 days in the summer. The complete development of *Pachyneuron aphidis* occupies from 16 to 20 days in the summer; the females construct a short suction tube for feeding. *Asaphes vulgaris*, Wlk., is very polyphagous, but was chiefly obtained from *M. sonchi* parasitised by *Praon* and *Aphidius*.

Feytaud (J.). **La question doryphorique au début de la campagne 1925.**—*Rev. Zool. agric. & app.*, xxiv, no. 5, pp. 93–102, 2 maps. Bordeaux, May 1925. [Received 21st August 1925.]

The area infested by the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in France in 1924, and the infested and protective zones as at the beginning of 1925 are shown in maps. On the whole, the outlook at the beginning of the year is considered favourable; while certain new areas have become infested, the total infested area is no larger than at the beginning of 1924; while infestation has extended towards the south, it has diminished in the north and west. The great potato-growing districts of France are as yet untouched by the pest.

Tempère (G.). **Les années à hannetons.**—*Rev. Zool. agric. & app.*, xxiv, no. 5, pp. 102–106. Bordeaux, May 1925. [Received 21st August 1925.]

Although the year 1925 is marked by the appearance of cockchafers in certain parts of France, there are other parts of the country where

scarcely one is to be found. There are two species of cockchafer in France, *Melolontha melolontha*, L., and *M. hippocastani*, F., and though neither of them appears in numbers at the same time in all regions, there are three principal areas in which they appear at different times. Moreover, in cold districts development may take four years instead of the usual three, and even in regions where the normal cycle is three years, exceptional climatic conditions may result in the production of a four-year generation.

FEYTAUD (J.). **La défense collective contre les fléaux de l'agriculture.** —*Rev. Zool. agric. & app.*, xxiv, no. 5, pp. 107–114, 2 maps. Bordeaux, May 1925. [Received 21st August 1925.]

It is pointed out that individual effort to control insect pests is practically nullified if no concerted action is taken, and that, while the principle of co-operation has made great progress among the agricultural population during the past 20 years, further advances in this direction are urgently needed. Some examples are given showing the value of concerted action in the past, and in particular the work of the Defence Syndicate of Saint-Pierre-d'Oléron in dealing with *Otiorrhynchus sulcatus* [*R.A.E.*, A, v, 40] is traced from its beginning. It is suggested that in the future every region should have its own organisation to deal with insect invasions as they arise.

DELASSUS (—). **Une invasion de** *Decticus albifrons*, **Fab., dans la région de Maillot.**—*Rev. Path. vég. & Ent. agric.*, xii, pt. 1, pp. 38–39. Paris, January–March 1925. [Received 27th August 1925.]

A local outbreak of *Tettigonia* (*Decticus*) *albifrons* in Algeria was checked by the Tachinid parasite, *Blaesoxypha cochlearis*, in 1924.

SEMICHON (L.). **Sur l'Anguillule de la Betterave :** *Heterodera schachtii*, **Schmidt, dans les tubercules provenant du Maroc.**—*Rev. Path. vég. & Ent. agric.*, xii, pt. 1, pp. 40–43. Paris, January–March 1925. [Received 27th August 1925.]

Observations have been made on the location of the Nematodes, *Heterodera schachtii*, Schmidt, in beet-roots, the material for examination being received from Morocco. The technique employed is described in detail. The results prove that the very young Nematodes instead of entering the soil at once may remain for some time feeding in the beet. Many of these young were found in the parenchyma, but the majority occurred where the cells of the beet were richest in protoplasm.

TROUVELOT (B.) & WILLAUME (F.). **Sur un nouveau principe de pulvérisateur utilisant la chaleur comme force dynamique et activante. (Brouillards tièdes surhumidifiés.)**—*Rev. Path. vég. & Ent. agric.*, xii, pt. 1, pp. 44–55, 3 figs. Paris, January–March 1925. [Received 27th August 1925.]

The existing types of sprayers used in France are discussed, among their chief defects being the smallness of the area treated and the unevenness of the application in the case of a jet, whereas with the

diffused type of sprayer the circumference of the circle receives the bulk of the application and the centre very little. Experiments have recently been made with an apparatus provisionally constructed, in which the spray liquid is heated and forced through the nozzle by the resulting steam. The steam itself is also ejected, the combination producing a dense cloud of great wetting capacity projected for about 5 feet or more. The nozzle of the sprayer is so constructed that the tube conveying the steam is inside a larger tube conveying the spray liquid ; the latter is thus re-warmed to anything up to 100° C. [212° F.] depending on the length of this sleeve-like tube. This method is particularly suitable for the less accessible pests, and has been successfully tried against various insects including the Tingid on rhododendrons [*Stephanitis rhododendri*]. *Hyponomeuta* spp. were destroyed in their nests in May by this method, using nicotine soap sprays, no damage being done to the foliage. The Aphids, *Aphis rumicis* (*euonymi*) on *Euonymus* and *Myzus cerasi* on wild cherry, were destroyed by the same spray, though the infestation was well advanced, the leaves being curled and necessitating a very thorough application. Ordinary sprayers required a larger amount of spray material and time expended in order to obtain the same results.

Deposits of Arsenic and Copper on Eating Apples.— *Jl. Minist. Agric.*, xxxii, no. 6, pp. 549–553. London, September 1925.

An examination of apples from English, Canadian and American orchards has been made in order to estimate the possibility of poisoning as a result of their consumption. The amounts of arsenic, lead and copper found are tabulated. The bulk of the deposits is on the stalk, calyx and the small amount of peel near them, but even if the apples are entirely eaten, including all these parts, the amount of the poisonous substances present is too small to be considered harmful. In all the tests there was only one exception, *i.e.*, apples from British Columbia that had presumably been sprayed when the apples were well developed, and from which the spray had not been washed off by subsequent rains. It is evident that growers may have to substitute some other poison than lead arsenate for abnormally late spraying. These late sprayings are not applied in England.

D'Emmerez de Charmoy (D.). [**Report of**] **Entomological Division.**— *Ann. Rept. Dept. Agric., Mauritius, 1924*, p. 12. Port Louis, Mauritius, 1925.

The measures carried out against *Lachnosterna* (*Phytalus*) *smithi* infesting sugar-cane are described below. The scarcity of the parasite, *Tiphia parallela*, in certain localities is being investigated. Experiments in controlling the ant, *Solenopsis geminata*, have shown that a kerosene-creoline emulsion gives good results.

D'Emmerez de Charmoy (D.). **Rapport sur les opérations pour le contrôle du** *Phytalus smithi* **pendant la saison 1923-24.**—*Rev. agric. de l'Ile Maurice*, no. 19, pp. 378–380. Mauritius, January–February, 1925.

The collection of adults of *Lachnosterna* (*Phytalus*) *smithi* was continued in Mauritius in 1923–24 on the same lines as in previous

years [*R.A.E.*, A, ix, 145, etc.], a total of 52,000,000 insects being collected during the year. In one locality, a fresh area of infestation in a newly-planted field was dealt with by ploughing between the lines of sugar-cane and collecting the insects by hand from the furrows; in this way the infestation was considerably reduced. *Tiphia parallela* was liberated in numbers in any area where infestation was severe.

EDWARDS (W. H.). **Les "Vers gris."**—*Rev. agric. de l'Ile Maurice*, no. 20, pp. 413–415. Mauritius, March–April, 1925.

The Noctuids, *Prodenia litura*, F., and *Spodoptera mauritia*, Boisd., which attack a great variety of plants, do not hibernate in Mauritius, but are able to breed continuously throughout the year. The European method of planting at a time when the young shoots cannot be attacked by such caterpillars is therefore inapplicable. The remedies practised in Mauritius are to dig round the base of the plants during the day, when the larvae are generally found at a depth of 1 or 2 inches, and to collect them at night on the ground by artificial light. A successful poison bait is made by dissolving 1 oz. arsenic and 2 oz. sugar in $\frac{1}{2}$ gal. water, with the addition of $2\frac{1}{2}$ lb. bran, to be applied at the rate of 5 lb. per acre. On small areas the ground should be washed copiously with a 1 per cent. creolin solution. Cardboard or metal discs are also recommended to protect the plants from attack.

VINSON (J.). **Les insectes carnassiers et l'agriculture.**—*Rev. agric. de l'Ile Maurice*, no. 20, pp. 415–418. Mauritius, March-April 1925.

A general account is given of predacious and parasitic insects. Among the most useful in Mauritius are *Polistes hebraeus*; the Coccinellid, *Chilomenes lunata*, which destroys Aphids and Coccids; the Syrphid, *Xanthogramma pfeifferi*, which destroys many Aphids on crucifers; *Tiphia parallela*, introduced against *Lachnosterna* (*Phytalus*) *smithi*; and Scoliids, such as *Scolia rufa* and *S. oryctophaga*, which also destroy these cane-grubs.

Decree prohibiting the Importation into the Country of Fresh Fruits and Vegetables from Regions in which the Fruit Fly exists.—2 pp. Typescript. Buenos Aires, 14th April 1925.

The importation into Argentina of fresh fruits and vegetables from regions in which the fruit-fly, *Ceratitis capitata*, exists is prohibited, except for lemons, coconuts, pineapples and bananas. The prohibition includes Peru, Brazil, Australia, New Zealand, South Africa, Cuba, Spain and Italy. Fruit from abroad, the importation of which is permitted, must be brought in by specified routes, or through specified ports.

SOBRERO (L. R.). **La isoca en la alfalfa.** [The Lucerne Caterpillar.]—*Gaceta Rural*, xviii, no. 216, pp. 1111–1113, 2 figs. Buenos Aires, July 1925.

This is a popular account of the lucerne butterfly [*Colias lesbia*, F.] in Argentina [*R.A.E.*, A, xii, 224].

CALDAS (D.). **A praga do cafeiro no estado de Parahyba.** [The Coffee Pest in the State of Parahyba.]—*Bol. Minist. Agric. Ind. e Comm.*, xiv, no. 5, pp. 571–576. Rio de Janeiro, May 1925.

A Coccid, *Cerococcus parahybensis*, Hemp., is a serious pest of coffee in the Brazilian State of Parahyba. It probably has a wild food-plant from which it has migrated to coffee. It is proposed to study the cultural measures unfavourable to it and to destroy the very heavily infested plantations.

DE AZEVEDO MARQUES (L. A.). **A cigarrinha nociva aos pomares (*Aethalion reticulatum* L.).** [The Bug injurious in Orchards.]—*Chacaras e Quintaes*, xxxii, no. 1, pp. 33–37, 2 figs. S. Paulo, 15th July 1925.

In Brazil the Membracid bug, *Aethalion reticulatum*, L., is a pest of lemon and other species of *Citrus*, mangos, etc., sucking the sap of the shoots and causing them to die. The female lays about 100 eggs, which hatch in about 30 days. The total life-cycle covers 105 days. The eggs are parasitised by *Abbelloides marquesi*, Brèthes. Spraying with an emulsion of kerosene 8 gals., soap 5 lb., and water 4 gals., diluted with 10–15 parts water for use, is recommended; the egg-masses should be collected and kept in boxes with a wire gauze cover permitting *A. marquesi* to escape.

BONDAR (G.). *Cratosomus undabundus* **Gyl., broca das goiabeiras.** [*C. undabundus*, a Borer of Guava Trees.]—*Correio-agric.*, iii, no. 7, pp. 175–178, 2 figs. Bahia, July 1925.

The Curculionid, *Cratosomus undabundus*, Gyll., is one of the worst pests of guavas in Brazil. The eggs are laid in January and February on the smaller branches, and the larvae bore through these into the larger branches and trunk. The excreta are expelled through side-mines, which occur at intervals of 2–6 inches and reveal the presence of the borer. The larval stage lasts 22 months. Pupation occurs in a chamber formed by closing the burrow with wood débris in front and behind the larva. The larva and adult are briefly described. An injection of 1 cc. of carbon bisulphide or of 1 cc. of a 5 per cent. solution of sodium arsenate in the most recent lateral bore-hole, which is characterised by the flow of sap, will kill the larva.

Proclamations under the Plant Protection Ordinance.—Grenada, 20th July 1922, 4th February 1924, and 30th May 1924. [Received 2nd September 1925.]

These three Proclamations respectively forbid the importation into Grenada of the following: Lime plants and fruits from British Guiana, Trinidad and Dominica; cotton seed or seed cotton from St. Vincent, except under licence; and sugar-cane from Trinidad, except plants of the Uba variety, owing to the occurrence of mosaic disease there.

Cotton Plant Protection Ordinance, 1924.—5 pp. Grenada, 1st May 1924. [Received 2nd September 1925.]

Under this Ordinance to provide for the protection of cotton against the pink bollworm [*Platyedra gossypiella*, Saund.], all cotton plants must be cut back to not more than 12 inches from the ground before

the prescribed close season ; and all the parts cut off, with all fallen bolls and scattered seed cotton and all okra plants [*Hibiscus esculentus*], must be burned. All seed cotton must be ginned or exported within 30 days from the beginning of the close season, and all cotton coming from the gins must be fumigated before the end of the day.

Work in Connection with Insect and Fungus Pests and their Control.—*Rept. Agric. Dept. St. Kitts-Nevis, 1923–24,* pp. 5–6 & 33. Trinidad, 1925.

Cotton in St. Kitts was infested with numbers of *Alabama argillacea* (cotton worm), and in some districts large quantities of poison were used against it, but no actual damage was done to the crop. *Platyedra* (*Pectinophora*) *gossypiella* (pink bollworm) did little damage to the first picking of cotton, but seriously injured that planted later. If the precautions regarding cleaning up of the old crop are rigidly carried out, the first picking should be gathered without appreciable loss, and if all cotton could be planted at the same time, or in the same month, it should be possible to grow a good crop in spite of this pest. Cotton stainers [*Dysdercus*] and leaf blister mite [*Eriophyes gossypii*] appear late and are kept in check by a close season and early planting. The plant legislation in force to March 1924 is reviewed.

In Nevis, the above remarks on cotton pests are applicable, except that *E. gossypii* seems to be increasing. The moth borer of sugar-cane [*Diatraea saccharalis*] was abundant, probably on account of the prolonged dry season, and growers were advised to discontinue growing Guinea corn [*Sorghum*] in the neighbourhood of cane fields.

FREEMAN (W. G.). **Plant Pathology.**—*Rept. Dept. Agric. Trinidad & Tobago, 1924,* pp. 22–24. Trinidad, 1925.

A few isolated outbreaks of *Brassolis* [*sophorae*] (coconut butterfly) occurred, but were controlled by natural enemies. An unusually severe outbreak of the Limacodid moth, *Natada urichia,* resulted in stripping the leaves from the coconuts on one estate, but was finally checked by natural enemies. The campaign against parasol ants [*Atta*] was continued ; 1,100 nests were destroyed, using 137 gallons of carbon bisulphide. Promising results were obtained in experiments with sodium cyanide for this purpose. The cacao beetle [*Stirastoma depressum*] was more injurious than for years past, probably on account of the dry season, localities with low rainfall being always the most affected. Cacao thrips [*Heliothrips rubrocinctus*] continued to be troublesome in the north-eastern areas ; improved cultivation and avoidance of exposure are considered the only permanent remedy. Mole crickets were more numerous than for years past, but were reduced in numbers later in the year by a parasitic fungus. The plantain weevil [*Cosmopolites sordidus*] continued troublesome on bananas and is now recorded from Tobago.

[CANADA.] **Destructive Insect and Pest Act and Regulations thereunder. Acts, Orders and Regulations, No. 8.**—Revd. edn., 27 pp. Ottawa, July 1925.

This revised edition brings up to date the Regulations under the Destructive Insect and Pest Act [*R.A.E.*, A, v, 479 ; xi, 475 ; xii,

163, 330, 414], the revised Regulations, which only contain slight alterations, being 1st Revisions of Foreign Regulations, nos. 2, 5, 8, 11 and 14, 2nd Revisions of Foreign Regulation no. 10, and of Domestic Regulation no. 1, and 4th Revision of Domestic Regulation no. 2.

PARSHLEY (H. M.). **A Bibliography of the North American Hemiptera-Heteroptera.**—8vo, ix+252 pp. Smith College, Northampton, Mass., 1925.

The 2,250 titles comprising this useful annotated bibliography are arranged under some 600 authors. Omissions will naturally be found among the papers of recent date, but it has been thought better to include all those that have come to the notice of the compiler up to the last moment than to conclude the enumeration arbitrarily at a definite time. A list of periodicals cited (with their abbreviated titles) and some blank leaves for addenda are appended.

WALKER (G. P.). **Sprays *vs.* Dust on Apples in New Brunswick.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 8–16. Truro, N.S., May 1925.

Experiments have been carried on since 1921 to determine the relative efficiency and cost of spraying and dusting for the control of apple pests in New Brunswick. Three applications were made each year, viz., when the blossom buds were becoming pink, when the petals had fallen, and two weeks later. The first and third sprays consisted of Bordeaux mixture, 3 : 10 : 40, plus 1½ lb. calcium arsenate; the second (except in one case) of 1 lb. soluble sulphur, 5 lb. hydrated lime, and 1½ lb. calcium arsenate to 40 gals. water. The first and third dusts were 12 : 8 : 80 copper sulphate and arsenic and the second 90 : 10 sulphur-lead arsenate. The tabulated results show, in nearly all cases, a larger percentage of unblemished fruit in the dusted than in the sprayed plot, owing to the fact that the sprayed plot produced the greater quantity of russeted fruit. In only one year of the four did dust give the better control of scab, but in three years out of four it proved superior to the spray method for the control of insect pests. If it is assumed that calcium arsenate contains 26 per cent. metallic arsenic and lead arsenate 20 per cent., the dusted plot received 11 lb. metallic arsenic per acre more than the sprayed plot, which may to some extent account for the better control of insect pests obtained from the dust. A comparative table of costs shows that spraying costs about 26*s.* per acre more than dusting.

SPITTALL (J. P.). **Varietal Susceptibility of the Apple to various Injuries.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 17–22. Truro, N.S., May 1925.

It has been recognised for many years that certain varieties of apple foliage and fruit are more susceptible to fungi, insect attacks, and spray or dust injuries than others. Tables are given showing the degree of damage to various varieties, the most injurious insects taken for comparison being the bud moth [*Eucosma ocellana*, F.] and the green fruit worm [probably *Graptolitha bethunei*, G. & R.]. Lack of sunshine and wet weather are thought to accentuate the susceptibility of apple foliage to spray injury, particularly immediately preceding, during, and following the application of the spray. Whereas

one variety may be very susceptible to injury by one formula of spray or dust, it may be practically unaffected by another treatment that is injurious to varieties that in the first case suffered little or no damage. In one experimental orchard white arsenic as high as 8 per cent. with 92 per cent. sulphur dust did not injure the foliage of one variety, while it produced as much as 20 per cent. scorching on another variety, and also took off more than half the leaves.

BRITTAIN (W. H.,. **Some miscellaneous Insecticide Tests.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 23–42. Truro, N.S., May 1925.

Field and laboratory tests of various poisons, incidental to other work, have been carried on from time to time by the Division of Entomology of the Nova Scotia Department of Agriculture, the results of which have, in most cases, not previously been published. Extensive experiments for control of the potato beetle, *Leptinotarsa decemlineata*, Say, were carried out in 1916. Nearly all the standard arsenical poisons were effective against all stages of the beetles when used in a strength equivalent to 2·7 lb. of standard paste lead arsenate (15 per cent. AS_2O_5) to 40 gals. water. Commercial triplumbic lead arsenate was distinctly inferior to all others used. All poisons seemed to be reduced in toxicity when used with Bordeaux. Lead arsenate was apparently reduced 43 per cent. ; triplumbic lead arsenate, 28 per cent. ; zinc arsenite, 25 per cent. ; Paris green, 36 per cent. ; and calcium arsenate, 18 per cent. At the end of a week 52 per cent. of the adults and larvae of *L. decemlineata* were dead when Bordeaux was used alone, as compared with 24 per cent. when they were fed on unsprayed leaves and 40 per cent. where they had no food, the reduction in the last case being partly due to cannibalism. This apparent toxicity does not obtain to the same extent under field conditions. Nicotine sulphate showed a kill of 31 per cent., fish-oil soap alone (6 lb. to 40 gals.) being about equally effective. Good results were obtained with leaves dipped in water and dusted with basic slag, and also with a derris spray (3 lb. to 100 gals.). Field tests in 1919 showed that if properly timed a single application of any of the standard arsenicals can wipe out an outbreak of *L. decemlineata*, even when used in considerably less strengths than usually recommended. The poisons were applied before the last larval instar and after the maximum oviposition had been completed.

Field tests in 1920 showed that Bordeaux dust combined with $7\frac{1}{2}$ per cent. calcium arsenate and a spray of Bordeaux 40 gals. and lead arsenate 2 gals. destroyed all the larvae, as did the same strength of lead arsenate used alone, a spray of Bordeaux and derris being slightly less effective. Nothing was gained by adding nicotine sulphate or fish-oil soap to the Bordeaux spray. Laboratory tests in general confirmed these results, though a derris spray was much more toxic.

In 1920 a severe infestation on parsnips and other umbelliferous crops by an Aphid, *Cavariella* sp., was reduced to insignificant proportions by the use of nicotine sulphate. A derris spray reduced the infestation very little, even when soap was added. Fish-oil soap greatly reduced the infestation, but did not give satisfactory control.

In insectary tests with the larvae of fall webworm, *Hyphantria cunea*, Drury, lead arsenate killed less than half the larvae, and the results with contact insecticides were inconclusive.

Young larvae of *Phorbia* (*Hylemyia*) *brassicae*, Bch., and *H. antiqua*, Meig., were killed by dipping in a solution of mercury bichloride 1–1,000, and in a suspension of derris root, 3 lb.–100 gals. Derris was less effective than mercury bichloride against the older larvae, and no mature larvae were killed by it, while mercury bichloride destroyed 20 per cent.

In view of the fact that heavy drenching with sprays containing arsenical poisons against *Alsophila pometaria*, Harr., sometimes causes severe foliage injury to apples, soluble sulphur 1–50 with nicotine sulphate, 1 pint–100 gals., with or without the addition of 4 lb. fish-oil soap, and soluble sulphur 1–50 with 20 lb. fish-oil soap to 100 gals. were used with satisfactory results, though nicotine sulphate alone is not quite as good as with fish-oil soap. The fish-oil soap and sulphur spray caused serious scorching, but the other combinations were not followed by appreciable injury.

MOORE (W. H.). **Entomological Notes from Central New Brunswick.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 43–45. Truro, N.S., May 1925.

A collection of insects made by the author in 1924 included *Chermes abietis*, L., which, so far as observations went, confined its injury entirely to white spruce (*Abies alba*).

GILLIATT (F. C.). **Some New and Unrecorded Notes on the Life History of** *Entomophthora sphaerosperma*.—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 46–54, 1 pl. Truro, N.S., May 1925.

The study of *Entomophthora sphaerosperma*, attacking *Psylla* (*Psyllia*) *mali*, Schmidb., in Nova Scotia, was continued during the summer of 1924. The methods of artificially propagating the fungus, especially with a view to spreading the disease early in the year, are described [*cf. R.A.E.*, A, xi, 157; xiii, 188]. Cage work had previously been limited to adults of *P. mali*, and it was not till the spring of 1924 that success was obtained in the development of the fungus upon the nymphs. The negative results of previous efforts are attributed to the cool weather prevailing during the nymphal period, and to the nymphs being so well protected at the base of the leaf and flower clusters by the abundant honeydew that they secrete. During the last instar the nymphs scatter over the lower surfaces of the leaves, where they are readily accessible to spores. Light as well as a high temperature and humidity is a necessary condition for the satisfactory development of the fungus, and cages placed to receive direct sunlight yield better results than those placed in the shade. The temperature is not sufficiently high outside until the end of June or the beginning of July, and it is a great advantage if the fungus can be started in cages to plant in the field as soon as weather conditions permit. Experiments showed a high mortality of the Psyllids in cages which was thought to be due to the method of applying moisture, but 80 per cent. on examination showed some form of *Entomophthora sphaerosperma*, though when they first fell they gave no evidence of infection. Further investigations carried on under field conditions are described. In the field also it was observed that numbers of the Psyllids that had died of the disease dropped from the trees, the reduction that took

place being much greater than the number of diseased insects found adhering to the lower surface of the leaves. Comparison of the insects that had dropped in the cage and in the field showed that there were 40 per cent. of resting spores in the former, and only 2 per cent. in the latter. An attempt to disseminate the fungus to unaffected orchards by infected insects showed a fair measure of control, in view of the fact that the experiment was not undertaken until late in the season. The method of resting spore germination is described.

DUSTAN (A. G.). **The Present Distribution of the European Apple Sucker** (*Psyllia mali* **Schmidb.**).—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 55–57. Truro, N.S., May 1925.

Since the discovery of *Psylla* (*Psyllia*) *mali*, Schmidb., in Nova Scotia in 1919 it has spread into seven counties, and has also become firmly established in at least two counties in New Brunswick, which is remarkable on account of the wide stretches of water and marsh land to be traversed. In June 1924 the extreme western end of the Annapolis Valley was still exempt from the attacks of this pest, but in all probability, within a year or two, it will have invaded even that part of the Valley, and then all the fruit-growing sections will be infested.

GORHAM (R. P.). **The Chain-dot Moth as an Injurious Insect.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 58–59. Truro, N.S., May 1925.

Injury to a field of bog cranberries at Aylesford, Nova Scotia, by the larvae of the Geometrid, *Cingilia catenaria*, Drury (chain-dot moth) was observed in 1924. The caterpillars had a long feeding period and caused the almost complete defoliation of all plants in the area of the greatest abundance, with the exception of red pine, which was not touched. White pine, red spruce, tamarack, alder, grey birch, willow, poplar, ash and white maple were among the trees found defoliated, while the blueberry, huckleberry, *Rhododendron rhodora*, meadow-sweet, wild spiraea, sweet fern and cranberry were the preferred shrubs. Sedges and several species of grass were also attacked. Larvae were also found in great abundance elsewhere on bog land, and in one locality on high, dry barren land, where the food-plant was almost exclusively sweet fern.

In experimental feeding the larvae were found to eat readily the foliage of apple, plum, pear, and numerous other trees. Emergence of the moths began on 5th September and continued for three weeks. Oviposition began on 10th September, the moths depositing on an average 140 eggs each. Three Tachinid parasites were reared from the larvae, *viz.*, *Madremyia saundersi*, Wlst., *Masicera festinans*, Meig., and *Phryxe* (*Zenillia*) *vulgaris*, Fall.

SPITTALL (J. P.). **Insects of the Year in the Maritime Provinces, 1924.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 60–75. Truro, N.S., May 1925.

This report is compiled in collaboration with members of the Acadian Entomological Society, and gives the localities in which the various outbreaks of insect pests occurred.

WHITEHEAD (W. E.). **Notes on the Currant Leaf-roller** (*Cacoecia rosana*, **Linn.**) **in Nova Scotia.**—*Proc. Acadian Ent. Soc. 1924*, no. 10, pp. 76–79, 1 pl. Truro, N.S., May 1925.

Tortrix (*Cacoecia*) *rosana*, L. (*hewittana*, Busck) has only been recorded locally in Nova Scotia, but it is probable that it will be found in many localities, as it has a very wide range of food-plants [*cf. R.A.E.*, A, xii, 169]. The material on which these notes are based was obtained from egg-masses on an apple seedling, deposited in captivity, and from those found on currant. The egg-masses on the apple were deposited in various parts of the tree; those on currant were on the old wood, and all were within 10 inches of the ground, many being very near it. The first larvae appeared on 27th May, and large numbers were found by the end of the month. The larval period lasted approximately four weeks, pupation occurring within the rolled leaves where the larvae had been feeding. The moths emerged between 5th and 24th July. They are very active in the evening, but remain hidden during the day. Only one parasite, *Exorista pyste*, Wlk., was reared from the material under observation.

Lead arsenate or calcium arsenate mixed with 7 or 8 parts of hydrated lime and dusted on the currant bushes when moist gives very satisfactory results, if applied as soon as the larvae appear and before they begin rolling the leaves. Miscible oils are said to be effective in killing the eggs.

SWAINE (J. M.). **New Species of Ipidae** (**Coleoptera**).—*Canad. Ent.*, lvii, no. 8, pp. 192–197. Orillia, Ont., August 1925.

The new Scolytids described are *Pityophthorus boycei* from California, *P. gracilis* from Oregon, and *P. elongatus* and *P. tenuis* from British Columbia, all on *Pinus contorta*; *P. cutleri* from British Columbia, and *Ips ponderosae* from Arizona on *Pinus ponderosa*; *P. borealis* from Arctic Canada on white spruce [*Picea canadensis*]; *I. chamberlini* from Oregon on *Pseudotsuga taxifolia*; *P. carinulatus* from New Mexico; *P. rugicollis* from California; and *P. exilis* from Oregon. No food-plants are given for the last three species.

MCLAINE (L. S.). **Oriental Peach Moth.**—*Canad. Hortic.*, Fruit edn., xlviii, no. 8, p. 176. Peterboro, Ont., August 1925.

A brief review is given of the bionomics, distribution and importance in the United States of the oriental peach moth [*Cydia molesta*, Busck], and of the regulations against its introduction into Canada [*R.A.E.*, A, xiii, 423].

Entomology and Parasitology.—*Rept. Agric. Expt. Sta. Univ. Cal., 1923-24*, pp. 37–39 & 42–43. Berkeley, Cal., 1924. [Received 12th August 1925.]

Of the several species of parasites imported from S. Africa against the black scale [*Saissetia oleae* Bern.] on *Citrus*, and released in California, *Coccophagus modestus*, Silv., and *C. trifasciatus*, Comp., are the most promising. Calcium cyanide dust and nicotine dust have been utilised particularly as a means of killing the adults of the grape leafhopper [*Erythroneura comes*, Say] in early spring. For the fumigation of *Citrus* calcium cyanide is effective against insects, but

is injurious to the trees under certain climatic conditions. It proved less satisfactory than paradichlorobenzene against peach-tree borer [*Aegeria exitiosa*, Say].

It has been found in the continued study of curly leaf of sugar beets that non-infective beet leaf-hoppers [*Eutettix tenella*, Baker], when allowed to feed on infected beets, transmitted the disease at the end of two hours. In one locality 17 per cent. of the spring brood adults collected in the foothills transmitted curly leaf to sugar beets, and 1 per cent. of the winter food-plants, *Erodium cicutarium* and *E. moschatum*, harboured curly leaf under natural conditions. Eleven species of weeds of the family Chenopodiaceae, which serve as food-plants of the beet leaf-hopper, are susceptible to curly leaf.

Flooding as a control for the garden centipede (*Scutigerella immaculata*, Newport) [*R.A.E.*, A, xii, 578] has been continued with considerable success.

MACKIE (W. W.). **Prevention of Insect Attack on Stored Grain.**—*California Agric. Expt. Sta.*, Circ. 282, 8 pp., 1 fig. Berkeley, Cal., February 1925. [Received 12th August 1925.]

Observations of wheat seed stored from a few months to two years, and treated with copper carbonate dust, showed that no insect attacks occurred on dusted seed, while untreated seed in the same pile was reduced to bran by the attacks of the grain weevil, *Calandra* (*Sitophilus*) *granaria*, L., the flour beetle, *Tribolium confusum*, Duv., and the Angoumois grain moth, *Sitotroga cerealella*, Ol. Experiments were conducted to determine the effect of the copper carbonate dust applied in the proportion of 2 oz. per bushel in preventing insect attack. None of the insects apparently fed or laid eggs in the presence of the dust. All weevils exposed to it were dead at the end of 6 days and the flour beetles at the end of 8. Many hundreds of Angoumois grain moths confined in a jar half-filled with treated wheat did not lay eggs, though they lived for a period of three weeks or more.

The action of copper carbonate dust is limited to its caustic effect. It consists of varying proportions of copper carbonate and copper hydrate, and is insoluble in water, but slowly soluble in certain dilute organic and inorganic acids. It is very adhesive, and the beetles soon become coated with it when crawling in the treated seed. The softer, moister surfaces of the insects appear to be most affected, and the reaction that follows eventually causes death. In one experiment the weevils did not come in direct contact with the dusted seed, but they died as soon as those that did. Undoubtedly minute particles of the dust enter the respiratory system of the insects; it is so light and fine that it remains suspended in the air for long periods, and in a confined space is not carried away. The dust is sometimes applied at a greater strength than 2 oz. to the bushel, but it is usually unnecessary, and the fine dust is offensive to man and domestic animals. Some protection to stored grain of any kind is afforded by placing the dust where crawling insects must pass it to reach the grain. It should not be placed on grain to be used for food.

The value of this dust as a fungicide is also referred to; and it is pointed out that it may be applied on a large scale by means of the machines for treating seed grain with fungicidal dusts.

Work and Progress of the Agricultural Experiment Station for the Year ended December 31, 1924.—*Idaho Agric. Expt. Sta.*, Bull. 135, 55 pp. Moscow, Ida., January 1925. [Received 19th August 1925.]

Dusting experiments against the alfalfa weevil, *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.) on lucerne indicated that where calcium arsenate was used with sulphur or Mab sand, results compared favourably with those obtained by spraying. The imported parasite, *Bathyplectes curculionis*, Thoms., was about four times as numerous in South West Idaho as in 1923, and in a few instances parasitism reached 25 per cent. *Hypera punctata*, F., caused serious injury to clover. The first outbreak of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] in the commercial potato-growing districts of South Idaho was discovered in 1924, but the infestation was limited to a single field.

In the laboratory potato mosaic was shown to be transmitted by *Macrosiphum solanifolii*, Ashm.; but negative results attended attempts to transmit it by the agency of flea-beetles, *L. decemlineata*, thrips, the tarnished plant bug [*Lygus pratensis*, L.], the false chinch bug [*Nysius ericae*, Schill.], the apple leaf-hopper [*Empoasca fabae*, Harr.] and the peach aphis [*Myzus persicae*, Sulz.].

Extensive experiments showed that the snowy tree-cricket, *Oecanthus niveus*, DeG., on prunes may be almost completely eradicated by a single application of calcium arsenate dust or lead arsenate spray.

WAKELAND (C.). **The Fruit Tree Leaf Roller. Its Control in Southern Idaho by the Use of Oil Emulsion Sprays.**—*Idaho Agric. Expt. Sta.*, Bull. 137, 11 pp. Moscow, Ida., March 1925. [Received 19th August 1925.]

Extensive tests were made in 1923 and 1924 for the control of the fruit-tree leaf-roller [*Tortrix argyrospila*, Wlk.] on apples by oil emulsion sprays against the egg-masses and by lead arsenate sprays to kill the larvae. The former were much the more effective. Even two sprays (pre-pink and calyx) of lead arsenate at the rate of 8 lb. powder per 200 U.S. gals. water with 1½ lb. calcium caseinate proved of little value. Of the various oil emulsions used in 1924 the highest average percentage of kill (96·27) occurred when Diamond paraffin oil-potash fish-oil soap emulsion was used at a dilution of 6·64 per cent. The addition of phenol did not increase the efficiency of the emulsion, and increasing the percentage of the oil gave no better results. At the same strength union brown neutral oil and calcium caseinate emulsion killed 87·33 per cent. of the eggs. The three general classes of oil sprays ranked in comparative efficiency as follows: Home-mixed potash fish-oil soap emulsion, home-mixed calcium caseinate emulsion and commercial oil emulsions. When soap emulsifiers are used with hard water, the water should be softened with soda at the rate of ½ lb. to 1 lb. per 200 U.S. gal. tank, but calcium caseinate emulsions are preferable for use with hard water. The stock formulae used were lubricating oil 2 U.S. gals., potash fish-oil soap 1½ lb., and water to make a total of 3 U.S. gals.; and lubricating oil 2 U.S. gals., water 1 U.S. gal., calcium caseinate 4 oz. In the former the ingredients are boiled together; the latter is mixed cold.

The oils that have been most used are lubricating oils of light or medium body. The fuel oils, distillates, etc., have been removed,

but the oils have not been refined sufficiently to be used as motor oils. These include Diamond paraffin oil, red engine oils, etc. Another class is composed of the neutral oils, which, although they come from the portions from which lubricating oils are derived, are much less expensive because they need not be highly refined. Union brown neutral oil was used as a representative of this class of oil.

The oil sprays should be applied after the mild weather of spring has come and before the buds begin to open. Every egg-mass must be completely and heavily coated, more material being required than for cover sprays, and sufficient pressure must be maintained to force the spray entirely through the tree. The sprays should contain 7 per cent. of oil, and at this strength should only be applied during periods of moderate weather. As San José scale [*Aspidiotus perniciosus*, Comst.] can be controlled by a 3 per cent. oil emulsion under Southern Idaho conditions, no separate spray is necessary for it. In order to calculate the number of gallons of a stock emulsion required to obtain a certain percentage of oil in a spray, the number of gallons of spray to be made must be multiplied by the percentage of oil desired in the spray and the product divided by the percentage of oil contained in the stock emulsion.

WAKELAND (C.). **Seasonal Variation as it affects the Activity and Control of the Alfalfa Weevil in Idaho.**—*Idaho Agric. Expt. Sta.*, Bull. 138, 11 pp. Moscow, Ida., May 1925. [Received 19th August 1925.]

A comparison of the seasonal conditions in 1923 and 1924 is given in regard to their effects on the activity of *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.). The critical period in relation to the growth of the infested lucerne is from the time that the weevil larvae have become sufficiently numerous to do severe injury to the first crop of hay until they have reached their greatest numbers and have begun to pupate and stop feeding naturally.

In 1923, a late, cold spring retarded the activity of the weevil. Oviposition continued throughout the growing period of the first lucerne crop, and the larvae fed and developed slowly, so that as soon as they were numerous enough they caused steadily increasing injury throughout the growing period of the crop, and also seriously infested the second crop.

In 1924 a combination of conditions resulted in very early maturity of the weevil and an extremely short feeding period. Most of the eggs had hatched early in May, and hot, dry weather increased the rapidity of development of the insect and retarded the growth of the plant. Most of the larvae were pupating at the end of May, and the lucerne was able to recover from infestation afterwards, especially if it was watered.

In the control of this weevil in Idaho two sprayings are generally necessary, but under the conditions of 1924 one was found to be sufficient. Poison sprayed on the plant is effective for about ten days before new growth is available for the larvae. It can, therefore, be decided by the amount of injury ten days after the first application, whether a second one is needed.

The preponderance of evidence is that there is no danger to livestock from eating sprayed hay, though under some conditions there are indications that the presence of arsenic aggravates digestive or excretory disorders.

Pettit (R. H.). **The Cherry Leaf Beetle.**—*Michigan Agric. Expt. Sta.*, Circ. 68, 2 pp., 1 fig. East Lansing, Mich., June 1925.

Galerucella cavicollis, Lec. (cherry leaf-beetle) is common on wild pin-cherry [*Prunus pennsylvanica*] in Northern Michigan, and often does serious damage to cultivated cherries. The adult beetles come out from their hibernating places, usually fallen leaves and rubbish, in May or early June, and begin feeding on the cherry leaves. Eggs are laid during June, July and part of August just under the surface of the soil and hatch from late June on through August. The larvae feed on the leaves and then pupate under the soil, the adults emerging during late July or August. From this time till the beginning of October the beetles feed on cherry foliage till they crawl away to hibernate. Although *G. cavicollis* may feed on cultivated cherries, it is necessary, in order for the larvae to pupate, that the last larval stage be passed on the wild pin-cherry, and therefore the proximity of wild cherry trees to orchards is to be avoided. *G. cavicollis* may be controlled by a spray of lead arsenate (2 lb. powder to 100 U.S. gals. water or Bordeaux mixture) directed upward from beneath. The spray should be applied when the beetles first appear in May or June, and may be followed by another after the crop is picked.

Farmiloe (C.). **The Ailanthus Silkworm.**—*Bull. Brooklyn Ent. Soc.*, xx, no. 3, pp. 120–123. Brooklyn, N.Y., June 1925.

An account is given of *Philosamia cynthia* (ailanthus silkworm), which is easy to rear in captivity, and which may be found fairly plentifully in the United States, wherever the ailanthus tree (*Ailanthus glandulosa*) occurs. Its original home is Java, and it was imported into America from China in 1861.

Chittenden (F. H.). U.S. Bur. Ent. **Occurrence of** *Meligethes aeneus*, **Fab., in the United States.**—*Bull. Brooklyn Ent. Soc.*, xx, no. 3, p. 149. Brooklyn, N.Y., June 1925.

The Nitidulid, *Meligethes aeneus*, F., has been collected in several localities in the United States on the flowers of *Ranunculus* and willow. In other countries it has been recorded on mustard and as injuring the opening buds and blossoms of turnips. While it evidently breeds on wild crucifers, there is no record of its attacking cultivated crucifers in the United States. It is obviously an introduced species.

Severin (H. C.). **Insect and other Enemies harmful to Greenhouse Plants.**—*15th Ann. Rept. State Ent. S. Dakota, 1923–24*, pp. 10–63, 24 figs. Brookings, S. Dak., 1924. [Received 18th August 1925.]

An account is given of the more common insect pests found in the greenhouses of South Dakota, with a description of their life-history, the injury caused by them and measures for their control The species dealt with include the Aphids, *Macrosiphum* (*Macrosiphoniella*) *sanborni*, Gill. (black chrysanthemum aphis); *Micromyzus violae*, Perg. (black violet aphis); *Anuraphis maidiradicis*, Forbes, attacking the roots of asters; *Rhopalosiphum rufomaculatum*, Wils. (green chrysanthemum aphis); *Myzus persicae*, Sulz., *M. circumflexum*, Buckt., and *Aphis gossypii*, Glov., which feed on various plants, *Illinoia pisi*, Kalt. (pea aphis); *Cerataphis lataniae*, Boisd. (palm

aphis); and *Macrosiphum solanifolii*, Ashm., and *M. rosae*, L., attacking roses; the Coccids, *Aspidiotus cyanophylli*, Sign., *A. hederae*, Vall., *A. lataniae*, Sign., *A. rapax*, Comst., *Chrysomphalus aonidum*, L., *C. aurantii*, Mask., *C. dictyospermi*, Morg., *Diaspis boisduvali*, Sign., *D. echinocacti cacti*, Comst., *Aulacaspis (D.) rosae*, Bch., *Howardia biclavis*, Comst., *Fiorinia fioriniae*, Targ., *Hemichionaspis aspidistrae*, Sign., *Ischnaspis longirostris*, Sign., *Parlatoria pergandei*, Comst., *Orthezia insignis*, Dougl., *Coccus elongatus*, Sign., *C. hesperidum*, L., *Eucalymnatus tesselliatus*, Sign., *Saissetia oleae*, Bern., *S. hemisphaerica*, Targ., and mealybugs, of which the commonest is *Pseudococcus citri*, Risso; Aleurodids, of which the most injurious is *Trialeurodes vaporariorum*, Westw. (greenhouse whitefly); *Phlyctaenia rubigalis* Gn. (greenhouse leaf-tyer); *Diarthronomyia hypogaea*, Loew (chrysanthemum midge); Mycetophilids, such as *Neosciara coprophila*, Lint.; thrips, of which the commonest are *Frankliniella tritici*, Fitch, *Thrips tabaci*, Lind., *Heliothrips haemorrhoidalis*, Bch., *H. femoralis*, Reut., and *Haplothrips statices*, Hal.; the mites, *Rhizoglyphus hyacinthi*, Banks, and *Tetranychus telarius*, L.; millipedes; and woodlice, of which the commonest is *Armadillidium vulgare*, Latr.

Woglum (R. S.). **The Value of Sprays and Fumigation for Resistant Black Scale Control.**—*Cal. Fruit Growers' Exch.*, 20 pp. Los Angeles, Cal., July 1925.

This bulletin advocates remedies applying strictly to Eastern Los Angeles and Western San Bernadino Counties. Fumigation, where found satisfactory against the black scale [*Saissetia oleae*, Bern.] on *Citrus* should be continued, but where it has proved insufficient supplementary spraying with oil emulsions should be carried out.

Knight (Hugh). **Factors affecting Efficiency in Fumigation with Hydrocyanic Acid.**—*Hilgardia*, i, no. 3, pp. 35–56, 10 figs. Agric. Expt. Sta., Berkeley, Cal., May 1925.

A number of tests are described that were carried out in a gas-tight fumigatorium with the object of elucidating certain chemical as well as entomological problems connected with fumigation. It was found that a mean concentration of about 0·45 per cent. of hydrocyanic acid gas for 20 minutes was necessary in order to kill every individual of the Coccinellid, *Hippodamia convergens*, Guér., and *Chrysomphalus aurantii*, Mask. (red scale). In a gas-tight container the time and concentration factors may be varied reciprocally within certain limits. With an exposure of 40 minutes, the mean concentration necessary to kill resistant red scale was approximately 0·20 per cent. hydrocyanic acid gas, and for black scale [*Saissetia oleae*, Bern.] and citricola scale [*Coccus pseudomagnoliarum*, Kuw.] about 0·15 per cent. In commercial fumigation, the concentration is generally below these amounts. In citrus fumigation under canvas tents rapid diffusion of gas and rapid leakage go hand in hand, both being dependent upon gas pressure. Leakage is increased by both high concentration and high temperature, the highest concentration for a given dosage being maintained at the lowest temperature. The use of atomised liquid hydrocyanic acid maintains the highest minimum concentration over the longest time.

Dormant insects are resistant to hydrocyanic acid gas, whether this condition is due to pupation, moulting or low temperature, susceptibility to the influence of temperature varying directly with the activity of the insect. Beetles are more susceptible than Coccids, and black scale more than red. The resistance of red scale to hydrocyanic acid is not affected at any temperature at which fumigation can be carried on with safety to the tree (40–85° F.), so that as fewer of the insects are in the moulting stage during cold weather, winter fumigation is recommended where the scale has become resistant. For destroying Coccids there appears to be no practical advantage in introducing the gas in small units at short intervals over the single-discharge method.

Jordan (H.). **Toll of the Cotton Boll Weevil.**—*N.Y. Commercial*, reprint 8 pp. New York, N.Y., 7th July 1925.

The situation resulting from the gradual extension of the cotton boll weevil [*Anthonomus grandis*, Boh.] over the cotton crop from south-west Texas to Virginia during the past 30 years is reviewed, an analysis of the position in each State being given. An examination of the facts shows that no State, after infestation, has been able to regain its former yield per acre (with the possible exception of Oklahoma in 1924). Most of the States would be obliged to double their acreage in order to obtain the same productive yield as under pre-weevil conditions. Experience has shown that there is no profit to the grower unless at least half a bale of cotton per acre can be produced, and during the years 1920–1924 the cotton States showed an average yield of one bale per 3·2 acres. It is suggested that the future production of cotton must be undertaken on a restricted acreage and a highly intensive system of cultivation. The average farmer cannot successfully cultivate and handle more than 5 to 7 acres under cotton per plough under boll weevil conditions. Demonstrations of cotton growing have proved of incalculable value and well worth the outlay entailed.

Department of Entomology.—*36th Ann. Rept. Purdue Univ. Agric. Expt. Sta., 1922–23*, pp. 26–30, 2 figs. Lafayette, Ind., 1924. [Received 29th August 1925.]

Many of the pests dealt with have been recorded in a subsequent report [*R.A.E.*, A, xiii, 273]. *Frankliniella tritici*, Fitch (peach flower thrips) seems to be a permanent and increasingly important pest of peaches. The Chrysomelid, *Metachroma interruptum*, Say (apple fruit chafer) is recorded as a new pest of apples, the adults disfiguring the fruit by eating numerous small holes in the surface. Melons are seriously injured by the striped cucumber beetle [*Diabrotica vittata*, F.] and by the melon aphis [*Aphis gossypii*, Glov.]. On shade trees the chief pests are *Lepidosaphes ulmi*, L. (oyster-shell scale), which can be controlled by spraying soon after the larvae hatch with 2 per cent. lubricating oil emulsion, miscible oil 1 : 40, or 1 lb. fish-oil soap and 1 oz. nicotine sulphate in 5 U.S. gals. water ; and *Pulvinaria vitis*, L. (cottony maple scale), which can be treated as above, or, better, by a dormant spray, as the larvae are difficult to reach on the leaves during the summer.

PORTER (B. A.). U.S. Bur. Ent. **The Oriental Fruit Worm.**—*Purdue Univ. Agric. Expt. Sta.*, Circ. 122, 8 pp., 4 figs. Lafayette, Ind., May 1925.

An account, taken from other sources, is given of *Cydia* (*Laspeyresia*) *molesta*, Busck (oriental fruit worm), which was found in Indiana for the first time in 1924, and has not yet been studied under conditions in that State.

GOSSARD (H. A.). **The Oriental Peach Moth.**—*Mthly. Bull. Ohio Agric. Expt. Sta.*, x, no. 5–6, pp. 77–80, 2 figs. Wooster, Ohio, May–June 1925.

In view of the increasing importance of *Cydia* (*Laspeyresia*) *molesta*, Busck (oriental peach moth) as a general fruit pest, an account is given of its distribution, life-history and habits. The remedies recommended are spraying with arsenicals, though this is not always satisfactory, and ploughing under to a depth of more than 3 inches about 1st May to destroy the larvae that are on the ground among the rubbish at the base of the trees.

HAWLEY (I. M.). **Entomology.**—*Bienn. Rept. Utah Agric. Expt. Sta., 1923–24*, Bull. 192, pp. 42–44. Logan, Utah, January 1925.

Against the fruit-tree leaf-roller [*Tortrix argyrospila*] many dormant oil sprays have been tried with very varying results. Home-made sprays of lubricating oil with soap or calcium caseinate as an emulsifier proved cheaper than the commercial oils and just as effective. Lead arsenate against the larvae gave poor results. Against the blister mite [*Eriophyes pyri*] on apple some sulphur compounds, such as lime-sulphur, dry lime-sulphur, and soluble sulphur, applied either in autumn or early spring gave very good results. The sugar-beet root-maggot [*Tetanops aldrichi*] [*R.A.E.*, A, xi, 78] feeds on the roots of the beet and frequently cuts off the tip, in which case the plant dies. Early watering of beets is believed to keep the maggots feeding above the tip of the beet and so to prevent this. The use of paradichlorobenzene against the peach-tree borer [*Aegeria exitiosa*] seemed equally effective when applied either in spring or autumn. Calcium cyanide when driven into the nests with a dusting machine was effective against ants, but is too dangerous for general use. Baits of sodium fluoride, sugar and maize starch were successful against some species and are to be tried further, as well as an emulsion of carbon bisulphide and water. A dust of nicotine sulphate and a finely-powdered carrier, such as lime, sulphur or gypsum, gave good results against several species of Aphids.

Entomology.—*Ann. Rept. Iowa Agric. Expt. Sta., 1923–24*, pp. 42–46. Ames, Iowa, 1924.

The Hessian fly [*Mayetiola destructor*] is the principal pest of young wheat in Iowa, and on account of the very fluctuating emergence of the autumn generation, the daily count of pupae has been found to be the only constant and reliable factor to use in predicting the safe seeding date in that State. The larvae of the Tineid, *Tischeria malifoliella* (apple trumpet leaf-miner) constructs a trumpet-shaped mine beneath

the upper epidermis of the leaf; there are apparently three generations of the moth in Iowa. When infestation is severe, 1 pint of nicotine sulphate in 100 U.S. gals. of soapy water should be applied in July, when most of the second generation moths are flying and ovipositing on the leaves, and in autumn the fallen leaves should be raked together and burnt. Generally, however, the usual spray schedule for apples will keep this pest in check. Cucurbits were seriously infested by *Aphis gossypii* (melon aphis), which can be controlled by nicotine dust containing 2 per cent. free nicotine, and by *Diabrotica vittata* (striped cucumber beetle), which attacks the young seedlings and later on the flowers and leaves and the rind of the fruit. Chinch bugs [*Blissus leucopterus*], which appeared in increasing numbers, are checked by barriers of dust, refuse from gas plants, heavy road oil, crude creosote and calcium cyanide during the migration period. *Papaipema nitela* (common stalk borer), which feeds normally on weeds, caused much damage to oats, wheat, and other cereals, and to maize and garden plants. The onion maggot [*Hylemyia antiqua*] and the seed corn maggot, *Phorbia cilicrura* (*Pegomyia fusciceps*) were also troublesome, the latter particularly on ground containing much humus and where ploughing was done only just before planting.

Miller (A. E.). **Clover Mites and Chiggers.**—*Bimthly. Bull. Ohio Agric. Expt. Sta.*, x, no. 7, pp. 111–112. Wooster, Ohio, July–August 1925.

Bryobia praetiosa, Koch (clover mite) is widely distributed throughout the world, and damages a wide range of plants from orchard and shade trees to forage and garden plants. Following an attack the foliage may drop and fruit be malformed. In Ohio there are at least four generations in a year; in a greenhouse there may be as many as eight. The mites occasionally cause trouble by entering houses. Eggs may be destroyed on orchard trees by a dormant application of oil emulsion. If the mites are present in numbers on the trees a spray of 1 part commercial lime-sulphur with 50 parts of water and 2 parts flour paste as a spreader should be used. On lawns, flowers of sulphur might be dusted at the rate of 50 lb. per acre over the infested area. In houses, the mites can be killed by a direct application of petrol or benzine and persistent cleaning.

Yothers (W. W.) & Cole (F. R.). **The Citrus Aphid, *Aphis spiraecola* Patch.**—*Citrus Indust.*, v, no. 10, pp. 6–8, 18, 19, 1 fig. 1924. (Abstract in *Expt. Sta. Record*, lii, no. 8, pp. 753–754. Washington, D.C., June 1925.)

Much of the information concerning the biology and control of *Aphis pomi*, DeG. (*spiraecola*, Patch) has already been noticed from various papers. Oil emulsions are apparently cheaper than a 1 : 800 nicotine sulphate spray with soap, and both sprays killed the insects hit by them. Good results were also obtained with a dust of 2 per cent. nicotine, 40 per cent. sulphur and 58 per cent. inert ingredients. Insecticides have, however, been of little or no value in reducing the numbers of the pest, owing to its rapid increase. Remedial measures should be applied before the infestation becomes general.

A note on the influence of climate on the pest, by A. C. Baker, is included.

BRADON (K. E.). **Some Field Observations on the New Aphis.**—*Citrus Indust.*, v, no. 9, pp. 9, 24. 1924. (Abstract in *Expt. Sta. Record*, lii, no. 8, p. 754. Washington, D.C., June 1925.)

The damage to *Citrus* by the citrus aphis [*Aphis pomi*, DeG.], particularly to 10 year old or younger trees, prevented the formation of growth in the spring. The Aphids only live on the very tender growth, which they leave long before it is fully developed in search of younger growth or perish for lack of food. Practically all the fruit dropped, the remainder being warty and deformed. Older trees suffered rather less. Grapefruit [*C. decumana*] appears to be almost immune. Orange trees, severely attacked in the spring, partly recovered in the summer, but the lack of fruit was not made up by a June bloom. Attempts to induce a late bloom were almost all unsuccessful. It is considered that the sprays and dusts applied did not pay in actual results for the material and labour expended.

BASINGER (A. J.). **Report of Progress of the Orange Tortrix Investigation.**—*Citrus Leaves*, 1924, no. 9, pp. 1–3, 6 figs. (Abstract in *Expt. Sta. Record*, lii, no. 8, pp. 756–757. Washington, D.C., June 1925.)

Tortrix citrana, Fern., has been known as a pest of oranges in California for nearly 40 years. The life-history was studied in 1923. The eggs are laid on either surface of the leaves and hatch in from 8 to 10 days in the spring and summer. The larvae seek the tender growth, where they web together two or three leaves or make a nest in a curled leaf, feeding on the tender leaves or fruit hanging near. The larval stage varies from 40 to 50 days or more according to the temperature and abundance of food. Pupation occurs within the larval nest and occupies 10 to 14 days. The exact number of generations a year has not been determined, but at least four are indicated. The distribution of *T. citrana* in California is discussed. The importance of the pest is largely in the damage done to the fruit on the tree, though occasionally a larva may be packed with the fruit, where it will continue feeding and developing. The larva eats through the skin of the orange, often boring a hole through it and a short distance into the flesh. Some damage is done at blossoming time by the larva nibbling at the ovaries in the blossoms. The amount of fruit actually lost varies from a negligible percentage to as much as 20 or 25 per cent. of the crop.

Six primary parasites have been reared, including *Hormius basalis*, Prov., and *Apanteles aristoteliae*, Vier., the latter being the most important and responsible for 75 per cent. of the total parasitism.

Platynota tinctana, Wlk., another pest of oranges, though less important, is also being studied.

ELLIS (W. O.). **Some Lepidopterous Larvae resembling the European Corn Borer.**—*Jl. Agric. Res.*, xxx, no. 8, pp. 777–792, 2 pls. Washington, D.C., 15th April 1925. [Received 18th August 1925.]

The important differentiating structural characters of the various larvae resembling *Pyrausta nubilalis*, Hb. (European corn borer) are pointed out and illustrated, with a key. The species dealt with are *P. ainslici*, Heinr., *P. penitalis*, Grote, *Phlyctaenia rubigalis*, Guen., *Diatraea zeacolella*, Dyar, *Nomophila noctuella*, Schiff., *Loxostege*

similalis, Guen., *Epiblema scudderiana*, Clem., *E. strenuana*, Wlk., *Depressaria heracleana*, DeG., *Heliothis obsoleta*, F., and *Achatodes zeae*, Harris, notes on their life-history and habits being given.

Simmons (P.) & Ellington (G. W.). **The Ham Beetle,** *Necrobia rufipes* **De Geer.**—*Jl. Agric. Res.*, xxx, no. 9, pp. 845–863, 2 pls., 1 map. Washington, D.C., 1st May 1925.

A detailed account is given of the various stages and distribution of *Necrobia rufipes*, DeG. (ham beetle), which heavily infested dry-cured bacon stored in crates during 1921 in Baltimore and Washington. The work of previous authors is extensively reviewed. Though it attacks various products in other countries, in the United States it chiefly infests smoked pork and only attacks other materials on rare occasions. Both the larvae and adults feed on smoked meat, the latter superficially. The larvae at first burrow beneath the hide and later extend their feeding deeper into the meat, chiefly in the fat portions. The eggs are usually deposited in dry crevices inaccessible to the mandibles of roving adults. At temperatures of 70° to 85° F. the incubation period is 4 or 5 days. In confinement the larvae developed better when fed on larvae of *Piophila casei*, L., than on bacon. The shortest developmental period recorded was 30 days, including 17 days as a growing larva and 13 within the cocoon. The life-cycle may thus be as short as 36 days [*cf. R.A.E.*, A, xii, 36]. The results of experiments to test the ability of the larvae to withstand low temperatures indicate that the full-grown larvae are best able to withstand winter temperatures such as obtain at Washington.

The careful wrapping of meat is an important consideration in the prevention of infestation, while fumigation with hydrocyanic acid gas is probably the most effective means of control, and has been approved by the Bureau of Animal Industry, U.S. Department of Agriculture.

Hamlin (J. C.). **Important Opuntia Insects of the United States: Biological Notes on the Moth-borers (Pyralidae).**—*Pan-Pacific Ent.*, ii, no. 1, pp. 1–11. San Francisco, Cal., July 1925.

The three Pyralids dealt with attack the joints of *Opuntia* internally. Their various stages are described and their bionomics are discussed.

In Florida *Melitara prodenialis*, Wlk., has three generations a year; cocoons and larvae in all stages may be found in the field at almost any season. Under artificial conditions moisture was essential for oviposition. The larvae are very gregarious, as many as 26 being found under a web on a single small joint. When about one-fourth grown they enter the upper joints and continue downwards even to the subterranean parts of the plant. The injury is aggravated by various scavenging Diptera, which invade the hollowed out plants. Though *M. prodenialis* attacks all the more common prickly pears of Florida, its climatic limitations and the different texture of the western prickly pears preclude its prospering in the main cactus area of Texas. In Queensland laboratory experiments showed that the larvae do not develop satisfactorily in *O. inermis*, but *O. stricta*, the prickly pear of second importance there, being of similar texture to the Florida species, promises to be quite a suitable food-plant. Ants are the chief enemies

of *M. prodenialis*. *Brachymeria* (*Chalcis*) *pedalis*, Cress., was the only parasite observed, and is not at all abundant in Florida.

An undescribed species of *Melitara* is recorded from Texas, with brief biological notes. A Chalcid, *Pareniaca schwarzi*, Cwfd., was bred from the cocoons.

Olyca (*Melitara*) *junctolineella*, Hulst, has two generations a year, the winter and the summer being passed in the larval stage. The life-cycle is upset by transportation to Australia [*R.A.E.*, A, xi, 582], where it feeds readily in the laboratory on both *O. inermis* and *O. stricta*. The parasites reared from this species were *Apanteles mimoristae*, Mues., *P. schwarzi*, *B. pedalis*, *Frontina aletiae*, Riley, and an undescribed species of *Phaonia*. It is also attacked by ants.

CHAMBERLIN (W. J.). **The Coniferous Trees of the United States with the Scolytid (Ipid) Beetles said to attack them.**—*Pan-Pacific Ent.*, ii, no. 1, pp. 23–35. San Francisco, Cal., July 1925.

This list is compiled from all available literature, records of the Oregon Experiment Station, the author's collections in the western forests, and material obtained by exchange. It is hoped that it will be carefully checked by others so that a more complete and accurate list may be made at a future time. The list is arranged alphabetically according to the genera and species of the trees.

ROCKWOOD (L. P.). U.S. Bur. Ent. **On Night Flying and Attraction to Light in Acridiidae and the Relation of Meteorological Conditions thereto.**—*Pan-Pacific Ent.*, ii, no. 1, pp. 36–38. San Francisco, Cal., July 1925.

A study of previous literature concerning the night flying of Acridids indicates that it may frequently occur in the south-western United States, though it is of rare occurrence in northern latitudes. Details are given of an instance observed in Idaho in which the grasshoppers, *Conozoa wallula*, Scud., *Dissosteira spurcata*, Sauss., and *Spharagemon aequale*, Say, were seen flying round street lamps in large numbers at about 10 p.m. on a night in July. The principal factor occasioning the flight under discussion was thought to be the high night temperature (80° F. at 10 p.m.).

ESSIG (E. O.). **Economic Notes.**—*Pan-Pacific Ent.*, ii, no. 1, pp. 45–46. San Francisco, Cal., July 1925.

Forficula auricularia, L., caused considerable injury to flowering buds of carnations in California during 1925. Though extermination is probably impossible, the further spread of the pest might be prevented. *Laphygma exigua*, Hb. (beet army worm) occurred in great numbers on several thousands of acres of cotton near Bakersfield. Many fields of young plants were entirely destroyed. *Prodenia praefica*, Grote (yellow-striped army-worm) was also present, being particularly abundant along ditch banks and roadways. The infestation was controlled by broadcasting poison bran mash, which was later drilled into the rows with seed drills.

DE ONG (E. R.). **The Currant Moth on Peanuts.**—*Pan-Pacific Ent.*, ii, no. 1, p. 46. San Francisco, Cal., July 1925.

In view of the discovery of *Ephestia elutella*, Hb., in ground-nuts [*Arachis hypogaea*] received in California from China during the autumn of 1924, the danger of importing this product from the Orient during late summer is pointed out.

VAN DYKE (E. C.). [**Entomological Notes.**]—*Pan-Pacific Ent.*, ii, no. 1, p. 46. San Francisco, Cal., July 1925.

Haltica bimarginata, Say (alder flea-beetle) is particularly abundant and destructive to alders in various parts of California. *Phloeosinus cupressi*, Hopk. (cypress bark-beetle) is responsible for the death of a number of Monterey cypresses [*Cupressus macrocarpa*] in the same State. It is only destructive when large broods have been enabled to develop in dead trees or timber near the living ones.

CRAIGHEAD (F. C.). U.S. Bur. Ent. **Bark-beetle Epidemics and Rainfall Deficiency.**—*Jl. Econ. Ent.*, xviii, no. 4, 577–586. Geneva, N.Y., August 1925.

Drought periods have frequently been suggested as the most important single factor influencing outbreaks of bark-beetles [*R.A.E.*, A, xii, 489]. Outbreaks of the southern pine beetle, *Dendroctonus frontalis*, Zimm., are characterised by from one to three years of intense activity, with longer intervening periods during which the insect is extremely rare. Three widespread outbreaks occurred in so-called drought years, in West Virginia in 1891, in South Carolina in 1911, and in south-western Virginia in 1921. With some of the Western species of *Dendroctonus* the transition from endemic to epidemic status is not so marked, and annual surveys on the same forest over several years are required to obtain definite data. In order to determine if any relation exists between the occurrence of *D. frontalis* in destructive numbers and deficiencies in rainfall, all outbreaks since 1890 have been tabulated and compared with the precipitation records, and with the exception of two outbreaks in Virginia in 1922, when excessive rainfall was recorded, every outbreak occurred during periods of rainfall deficiency. Many observations indicate that these outbreaks originate locally on the higher points of southern exposure or drier situations from which the beetles spread as they increase in numbers. Late summer and autumn deficiencies seem to be more important than those at other seasons, and heavy precipitation during the periods of attack and brood development seem to be most effective in killing the beetles and the young larvae beneath the bark of the attacked trees. Preliminary observations and experiments with felled, girdled, fire-scorched, and defoliated trees indicate that the greater susceptibility of trees during drought periods and the destruction of the broods with increased precipitation are the results of the varying water content of the trees.

PARKER (R. L.). **Marking Honey Bees for Behaviour Studies.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 587–590. Geneva, N.Y., August 1925.

The most satisfactory method of marking bees is the use of one part powdered pigment mixed with one part liquid white shellac and diluted to the right consistency with ethyl alcohol.

STREETER (L. R.). **Influence of Temperature and Humidity upon the Volatilization of Nicotine from Tobacco Dust-Lime Hydrate Mixtures.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 590–593. Geneva, N.Y., August 1925.

The work of various authors on this subject is briefly described. Recent investigations showed that calcium hydrate was effective in releasing nicotine from tobacco dust [*R.A.E.*, A, xi, 359], and it was also observed that the addition of limited amounts of water to dry dusts increased the rate of evolution of nicotine from them, whenever this evolution was due to a chemical reaction between the nicotine-containing material and the carrier. Experiments were, therefore, carried out to ascertain under what conditions tobacco-lime mixtures liberate nicotine effectively. The tobacco used contained 4·45 per cent. nicotine and 6 per cent. moisture, and the tobacco dust was mixed with equal parts by weight of pure calcium hydrate, both materials being passed through a 150-mesh sieve before mixing. The results showed that sufficient moisture is more essential to the rapid evolution of the nicotine than a high temperature, a temperature of 70° F. with a relative humidity of 70 per cent. being a more favourable condition than a temperature of 90° F. with a relative humidity of 50 per cent. A temperature of 80° F. with a relative humidity of 70 per cent. is nearly equivalent to a temperature of 100° F., with a relative humidity of 60 per cent. Tobacco dust alone subjected to the same conditions liberated no appreciable amount of nicotine. In view of these facts a small quantity of water should be added to the tobacco dust-lime mixture just before it is applied in the orchard or garden, to ensure more rapid evolution of the nicotine. Provided there is not sufficient moisture to permit the chemical change, calcium hydrate acts as a diluent of the tobacco dust. If a diluent is desirable for tobacco dust of high nicotine content, calcium hydrate may be used for this purpose, or enough lime to convert the combined nicotine into a volatile form, together with some inert dust material of superior physical properties. After his paper was written the author heard that field experiments at Pennsylvania State College with mixtures of tobacco dust and hydrated lime gave a killing efficiency directly in proportion to the amount of water added to the dust mixtures, up to the quantity of water that is more than sufficient for the necessary chemical reaction. Beyond this amount efficiency decreased, as the water dissolved the liberated nicotine and rendered the dusts too damp.

WOGLUM (R. S.). **Observations on Insects Developing Immunity to Insecticides.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 593–597. Geneva, N.Y., August 1925.

This paper supports the observations of Quayle that the California red scale, *Chrysomphalus aurantii*, Mask., and the black scale, *Saissetia oleae*, Bern., on *Citrus* are developing greater resistance to fumigation with hydrocyanic acid gas [*R.A.E.*, A, xi, 80], and shows that the area of resistant scale is spreading. This development has become so pronounced in certain districts of California that a single treatment even at a greatly increased strength can no longer be depended upon to keep the pests in control. The margin of safety between the dose that the tree can tolerate and that required to destroy *C. aurantii* has been practically eliminated, and this has led to a shifting of the

fumigation season to the winter and spring months. Whereas the red scale was formerly thoroughly controlled by a dose of 75 per cent. [of the author's full dosage schedule], certain lemon orchards treated with twice the amount have needed a second fumigation during the same year, but double fumigation is often unsatisfactory and very expensive. This pest appears to be more difficult to control on lemons than on oranges even in the same orchards.

Tests of the comparative resistance of *C. aurantii* confirmed field experience, showing that it varies greatly in different localities. In 2 out of 8 the scale was eradicated at a dosage of 125 per cent. with a 45 minute exposure, but with this dosage living scale was found in all the other localities and in 4 it survived 150 per cent. dosage.

Fumigation doses of 100–120 per cent. can no longer be relied on to give control of *S. oleae* for a single year. There appears to be a decided variation in its susceptibility to the gas in different localities and even in orchards within the so-called resistant black scale area. The resistant black scale is confined to the interior citrus district, eastward from Los Angeles for 35–40 miles, where the red scale is readily controlled by ordinary fumigation. The author is of the opinion that these resistant strains are not springing up independently, but that the resistant red originated at Corona, and the resistant black at Charter Oak, the present resistant areas being due to the spread of these two strains.

CHAMBERLIN (T. R.). U.S. Bur. Ent. **A New Parasite of the Alfalfa Weevil.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 597–602. Geneva, N.Y., August 1925.

A Eulophid, *Tetrastichus incertus*, Ratz., existing over a wide area in Switzerland, France, Italy and Germany, has been found occasionally to parasitise a high percentage of the larvae of *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.) and is apparently normally a primary parasite. In 1923 several attempts were made to breed it as a secondary parasite upon *Bathyplectes curculionis*, Thoms., the most common parasite of larvae of *H. variabilis* in Europe, and also to breed the latter as a secondary parasite on *T. incertus*, but without success. In the laboratory *T. incertus* reproduced freely upon unparasitised larvae of *H. variabilis*. Parasitism of the pupae was never effected, and parasites found in the prepupae probably came from eggs laid in the larvae. Larvae in which parasitism is well advanced when the time for spinning the cocoon arrives, do not spin, but the others spin at about the usual time. Dissection of 16 parasitised weevil larvae disclosed an average of 10·7 parasites per host. Many parasites received in late summer failed to issue from their host until the following spring.

T. incertus was not found in any other host in the field. It was bred, however, by the author in the laboratory in larvae of *H. punctata*, F., but the adults which developed failed to emerge, presumably being unable to cut through the heavy integument. No insect suspected of being parasitic upon *T. incertus* was found in hosts collected from the field as larvae, but in a small percentage of parasitised prepupae, *Eupelmus atropurpureus*, Dalm., was found. Not more than one issued from a single prepupa, but all the primary parasites were destroyed. *E. atropurpureus* makes use of the weevil cocoon as a support during oviposition, and the need for such support probably accounts for its failure to parasitise *T. incertus* in active larvae of the weevil.

Although *T. incertus* is usually scarce, its distribution and the high rate of parasitism it sometimes attains would indicate that it may become an important parasite if introduced into the weevil-infested territory of the United States.

Snow (S. J.). U.S. Bur. Ent. **Observations on the Cutworm, *Euxoa auxiliaris*, Grote, and its Principal Parasites.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 602–609. Geneva, N.Y., August 1925.

This paper is a report of observations made in 1916 upon *Chorizagrotis* (*Euxoa*) *auxiliaris*, Grote, attacking lucerne in Utah, where a serious outbreak that occurred in the previous year appeared to have been controlled by parasites.

The larvae occurred in the fields during May and early June. Most of them disappeared beneath the surface of the soil during the second half of May, and after a few days made earthen cells, in which they pupated. In cages the average pupal period was 32 days, the first and last moth of the reared specimens emerging on the 17th June and 19th July respectively.

The larvae were usually to be found by day in the open loose soil between the plants. A few larvae seen above ground were observed to eat only on cloudy days. After sunset they appeared in greater numbers, feeding at the edges of the leaves, branches and stems, the stem being rarely cut off. Occasionally the stalks were completely stripped; in 1915 they were eaten down to and below the surface of the ground.

Out of 1,478 cutworms placed in cages 440 were killed by parasites as follows:—the Encyrtid, *Berecyntus bakeri*, How., 214; the Braconids, *Apanteles laeviceps*, Ashm., 77, *Meteorus vulgaris*, Cress., 26, and *Habrobracon erucarum*, Cushm., 1; the Ichneumonids, *Paranomalon* sp., 1, and *Amblyteles nuncius*, Cress., 13; the Tachinids, *Ernestia* sp., 74, and *Phorichaeta cinerosa*, Coq., 20; the Bombyliids, *Anthrax alternata*, Say, and *A. willistoni*, Coq., 9; the Phorid, *Aphiochaeta* sp., 3; and an unidentified digger-wasp, 3. Brief notes are given on all of these. *B. bakeri* was first detected in full-grown cutworms, 86 per cent. of which had made pupal cells. A single host larva may be infested by 1,000–1,500 or more. The first parasite larvae emerged from the host on 17th May and pupated on 9th June. The adult stage was reached during the month following 26th June. The adults from a given host were of the same sex. The first symptom of parasitism by *A. laeviceps* was unusual activity of the cutworm; after the parasite larvae emerged they usually lived from a few hours to 2 days, remaining on the surface of the ground. Cutworms attacked by *M. vulgaris* were seldom noticed till after the parasites had emerged and spun cocoons, leaving, in most cases, only the head of the host. The emergence of adults took place between 15th May and 8th July, the pupal stage averaging 12 days. A single *Paranomalon*, almost adult, was found within a cutworm pupa on 2nd November, remaining alive until 9th December. Nine adults of *Amblyteles nuncius* issued from cutworm pupae between 12th June and 3rd July, and four were found dead within shrunken host pupae. Of the cutworms parasitised by *Ernestia* sp. some lived long enough to build a cell. The first parasite larva was found on 4th May 1915, and the first adult issued on 2nd April 1916. Eight adults of *P. cinerosa* issued from cocoons found near dead

cutworms between 12th and 24th June. *A. willistoni* was reared from cutworm pupae between 7th and 25th August. From one of the larvae infested by *Aphiochaeta* sp., 15 adult flies emerged on 25th June.

LEWIS (H. C.). **Parasitism of the Strawberry Leaf-roller, *Ancylis comptana*, Frohl.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 609–612. Geneva, N.Y., August 1925.

In none of the accounts of outbreaks of the strawberry leaf-roller, *Ancylis comptana*, Frohl., which are more or less sudden and local, have parasites been mentioned as numerous. In Central Ohio *A. comptana* is common, but not a serious pest. Six species of Hymenopterous parasites were reared from the leaf-roller, and three more are listed as probable parasites in addition to one Tachinid. Of the 5 species previously recorded, *Cremastus cookii*, Weed, *Glypta phaxopteri*, Weed, *Isoperus alboricta*, Cress., *Macrocentrus ancylivora*, Rohw., and *Microgaster comptanae*, Vier., only the last was obtained. This parasite was taken in the autumn of 1923 and was common throughout the season of 1924, being also reared from the overwintering generation and taken from both larvae and pupae. The other parasites reared were :—a single specimen of *Sympiesis ancylae*, Gir., the parasite larva emerging from the host and the pupal stage lasting 8 days ; *Epirhyssalus atriceps*, Ashm., which also attacks other Tortricids ; *Elachertus aeneoniger*, Gir., one of the most common of the leaf-roller parasites ; *Cryptus incertus*, Cress. ; *Pleurotropis sexdentatus*, Gir., of which seven specimens were reared from a single leaf-roller, and which may possibly be a hyperparasite ; *Meteorus trachynotus*, Vier., *Pimpla* (*Itoplectis*) *conquisitor*, Say, and *Epitochalcis nelumbis*, Cress., the last three being taken from a mass of folded leaves containing leaf-roller larvae, and therefore regarded as possible parasites ; and the Tachinid, *Exorista pyste*, Walk., the pupal stage of which lasted about 8 days.

FLUKE, Jr. (C. L.). **Natural Enemies of the Pea Aphid (*Illinoia pisi*, Kalt.) ; their Abundance and Distribution in Wisconsin.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 612–616. Geneva, N.Y., August 1925.

This preliminary report is the result of studies in Wisconsin during the season of 1924. A list is given of 36 natural enemies of *Illinoia pisi*, Kalt., of which Coccinellids and Syrphids seem to be the most important. When the Aphids are collected in an aphidozer it is desirable that the predators should be returned to the fields. The following 3 methods of separating them from the Aphids was tried :—

The mass of material from the aphidozer was spread out in a thin layer and a white cloth placed on top, on which the Syrphid larvae and other predators crawled. This cover was then shaken in the field. This method was not entirely satisfactory, as many of the predators failed to crawl on to the cover.

The material from the aphidozer was sifted through a coarse screen to remove leaves ; it was then immersed in cold water and the Aphids floated while the Syrphid larvae, particularly, sank to the bottom. The water was then poured off and the Syrphids released. Most of them developed to normal adults.

It was also noticed that the Aphids soon died if placed in a container, such as a tall can or pail. From this mass 100 Syrphid larvae were selected (after standing over night) and all but 3 were reared to maturity. Thus, if the mass of collected material were allowed to stand

for 1 or 2 hours, it could then be scattered thinly back into the field and a large number of the predators would live, while the Aphids would die.

SMITH (L. B.). U.S. Bur. Ent. **Status of the Japanese Beetle in 1924.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 616–620. Geneva, N.Y., August 1925.

Popillia japonica, Newm., increased its distribution from 2,440 to 5,122 square miles during 1924. Delaware became infested, and 3 beetles were found in Pennsylvania at a point about 150 miles distant from the main area of infestation, though there are no records of nursery stock shipments from the infested area. During the summer of 1924 there occurred a migratory flight of the female beetles, which lasted 4 days. The beetles swarmed through the city of Philadelphia, and it is believed that they must have flown at least 5 to 7 miles. They alighted on vehicles of all kinds and undoubtedly were carried to distant points.

The progress of experiments for the control of *P. japonica* by means of insecticides and the work done in introducing its parasites into the United States are briefly reviewed. It is thought that the beetle will eventually be brought under satisfactory control. Studies of the various micro-organisms affecting the larvae show that several species of bacteria and fungi are playing a more important rôle each year.

LARSON (A. O.) & FISHER (C. K.). U.S. Bur. Ent. **Practical Field Control of the Common Bean Weevil,** *Bruchus obtectus*, **Say.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 620–625. Geneva, N.Y., August 1925.

An investigation of the practicability of controlling the common bean Bruchid, *Bruchus obtectus*, Say, in the field was carried out in Southern California in 1922. At least 85 per cent. of all lots of beans grown during that year were to some extent infested. The lengthy ripening season made it possible for the Bruchids to go from infested beans in storage to fields of ripening beans for a period of several months, and for two or more generations to develop in the field. Infested warehouses, where Bruchids are allowed to remain over the summer, are an important source of infestation [*R.A.E.*, A, xiii, 47], and there are indications that the amount of infestation at harvest is proportional to the number of Bruchids that have been liberated within flying distance of the fields during the time the beans are ripening, and that complete co-operation in preventing their breeding in dry beans during the summer would eliminate the Bruchids from the growing crops. Stress is laid on the importance of removing early in the season all possible breeding-places, and if small lots of beans have to be kept over the summer, they should be fumigated before the Bruchids begin to emerge. Bean straw stacks if not used up in the winter, should be scattered and ploughed under in the spring. Beans should be threshed as soon as they are ready, as the eggs are carried away in the chaff.

DE COURSEY (R. M.). **A Practical Control for the Pomace Fly.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 626–629, 1 fig. Geneva, N.Y., August 1925.

Drosophila melanogaster, Meig. (pomace fly) is often a serious pest in cider mills, fruit markets and other places where fruit is kept.

Tests were carried out with a number of substances ordinarily found in decaying fruits and likely to attract the fly, as well as with a series of volatile oils. None of the substances was so attractive as the decaying fruits themselves. A simple trap baited with fermented banana is described, which under practical conditions will furnish an adequate means of control, especially for indoor infestations. When fermented with yeast, banana appears to be the most attractive of the natural fruits; it has a longer period of attractiveness than other fruits tested and continued to attract flies for at least two weeks.

HERRICK (G. W.). **Methods of Control for Two Shade-tree Pests.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 630–632. Geneva, N.Y., August 1925.

A hedge of Norway spruce [*Picea excelsa*] infested by *Chermes abietis*, L. (spruce gall aphis) was thoroughly sprayed in April 1924 with 16½ lb. powdered lime-sulphur to 50 U.S. gals. water, which gave complete control. At the same time a similar outbreak was destroyed by the use of a proprietary oil emulsion. No injury to the trees was caused by the oil during the following summer and autumn, but in March, nearly a year later, a certain amount of defoliation at the ends of the branches was observed. This was not serious, however, and in other cases Norway spruce has been regularly sprayed with miscible oil without injury [*R.A.E.*, A, xi, 554].

An outbreak of *Phyllocoptes quadripes*, Shm. (maple bladder-gall mite) on the leaves of maple was completely controlled by spraying in April with 1 gal. lime-sulphur, 33° Bé., to 8 gals. water.

STEAR (J. R.). **Three Mirids predacious on the Rose Leaf-hopper on Apple.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 633–636, 1 fig. Geneva, N.Y., August 1925.

Typhlocyba rosae, L., was present in large numbers in 1923 in certain apple orchards in Pennsylvania, and the first generation of 1924 gave promise of another heavy infestation. The second generation, however, did not develop as expected. A partial explanation is thought to have been the presence on the apple foliage of the Capsids, *Plagiognathus politus*, Uhl., *Hyaliodes vitripennis*, Say, and *Diaphnidia pellucida*, Uhl., which were often observed to feed upon the leaf-hopper nymphs. The last-named was much the most abundant, and *P. politus* was observed only once. None of these Capsids was entirely predacious, and all could probably thrive on the apple foliage in the absence of leaf-hoppers. Descriptive notes are given on all stages of *H. vitripennis* and *D. pellucida*, and the adult of *P. politus*.

DE LONG (D. M.). **The Occurrence of the Beet Leaf-hopper, *Eutettix tenella*, Baker, in the Eastern U.S.**— *Jl. Econ. Ent.*, xviii, no. 4, pp. 637–638. Geneva, N.Y., August 1925.

The increase in acreage and production of sugar-beet in western Ohio and the adjoining States has raised the question of the possibility of *Eutettix tenella*, Baker, becoming a pest there. The insect, which had previously been recorded only in Colorado, Utah, New Mexico, Arizona, California, Southern Idaho and Oregon, has recently been found

at Miami, Florida, where it occurs abundantly on sea purslane, *Sesuvium portucastrum*, which is apparently a native food-plant and is distributed from North Carolina to Florida. It might, therefore, become a pest in the eastern States if sugar-beets were grown in sufficient abundance and proximity to native food-plants.

CHITTENDEN (F. H.). U.S. Bur. Ent. **Scarcity of the Imbricated Snout-beetle** (*Epicaerus imbricatus*, **Say**) **in the North.**—*Jl. Econ. Ent.*, xviii, no. 4, p. 638. Geneva, N.Y., August 1925.

Since 1902 no reports of injury by *Epicaerus imbricatus*, Say, have been received so far as is known, and the species appears to have completely disappeared in its more northern range. In 1899 a fungus, *Sphaerophthalma globuliferum*, was observed attacking the adult. Unless depletion in the numbers of the insect has been caused by this fungus, it must be due to climatic conditions or the unusual activity of other natural agencies, and to the inability of the beetle to spread by flight.

MCDONALD (R. E.). **A Tenebrionid attacking young Cotton.**—*Jl. Econ. Ent.*, xviii, no. 4, p. 639. Geneva, N.Y., August 1925.

Fields of cotton in parts of Texas were attacked in the spring of 1925 by a Tenebrionid, apparently previously unknown, probably a species of the genus *Steriphanus*. The damage was usually done soon after the cotton came out of the ground by the beetles gnawing the stem, and in some instances eating the leaves. The beetles remained below the surface of the ground during the hottest part of the day.

DUDLEY, Jr. (J. E.). **Cull Onions as a Trap Crop for the Onion Maggot.**—*Jl. Econ. Ent.*, xviii, no. 4, p. 639. Geneva, N.Y., August 1925.

Preliminary experiments with cull onions as a possible trap crop for the onion maggot, *Hylemyia antiqua*, Meig., carried on in 1924 in Wisconsin, indicated that useful results may follow this method of control. The problem of destroying the puparia before emergence of the flies was solved by treating the rows of culls with a mixture of crude road oil (45 per cent.), crank case drainings (45 per cent.), kerosene (8 per cent.), and creosote (2 per cent.). This mixture was applied with a sprinkling can at the rate of 1 gallon to every 25 feet of row. It was found that this treatment killed 83 per cent. of the different stages of the insect in the soil.

ROSENFELD (A. H.). **Why not Trap-crops that Entrap?**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 639–640. Geneva, N.Y., August 1925.

A previous paper under this heading [*R.A.E.*, A, xiii, 431] is briefly criticised, the author suggesting that many of the Diptera and Hymenoptera caught on *Meibomia amans* may have been beneficial parasites. He also quotes observations to the effect that *Melinis minutiflora* does not entrap ticks, but merely repels them [*R.A.E.*, B, xiii, 2].

BRYAN, Jr. (E. H.). **The Levuana Moth in Fiji.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 640–641. Geneva, N.Y., August 1925.

Levuana iridescens, B. B., is not thought to be a native of Fiji, but all the coconut districts are seriously menaced by its spread in the islands [*R.A.E.*, A, xii, 298]. Such artificial control as sprays, traps and smoke screens have proved useless and only served to spread the moth. Besides palms, it sometimes attacks banana, sugar-cane and even bread fruit [*Artocarpus incisa*]. Attempts to discover the home of the moth or to find parasites of related species are briefly reviewed.

A closely-related moth, *Pollanisus subdolosus*, Wlk., found in Queensland on *Myrtus* and *Eugenia*, is parasitised by a Tachinid which, it is hoped, may also attack *L. iridescens*.

BALLARD (E.). **The Pink Bollworm in Australia.**—*Jl. Econ. Ent.*, xviii, no. 4, pp. 641–642. Geneva, N.Y., August 1925.

Two well defined races of *Platyedra gossypiella*, Saund., are established in Queensland, one occurring on species of wild *Hibiscus* and not having been found on cotton. It differs from the typical form in being more deeply and evenly coloured, in the crochets of the forelegs forming a pattern of two opposite arcs and not a complete horseshoe, and in the very marked chitinisation of the setiferous plates. The larvae from Western Australia and the Northern Territory belong to the typical form.

The present situation in Queensland is reviewed in continuation of a previous report [*R.A.E.*, A, xiii, 388]. Only three gins are in use, so that a fairly good record can be kept of any new areas that become infested. Vigorously applied legislation, or co-operation on the part of the farmers would keep the pest in check, but in present circumstances it can only be hoped to prevent its spread to uninfested areas.

Horticultural Inspection Notes.—*Jl. Econ. Ent.*, xviii, no. 4, pp. 653–654. Geneva, N.Y., August 1925.

Larvae of the Mediterranean fruit-fly, *Ceratitis capitata*, Wied., have been intercepted in several lots of loquats from the Azores. Unidentified Curculionid larvae were taken from dahlia roots from Italy in April, though dahlia roots are stated to be remarkably free as a rule from Coleopterous larvae. Another weevil, *Palaeopus costicollis*, Mshl., was taken in yams from Haiti. *Porthetria dispar*, L., together with several insects of less importance, was found in a cargo of oak logs from Japan.

SCHULTZE (W.). *Macroxenos piercei* (**Order Strepsiptera**), **a New Genus and Species of Wasp Parasites of the Philippine Islands.**—*Philipp. Jl. Sci.*, xxvii, no. 2, pp. 235–241, 1 pl. Manila, June 1925.

Macroxenos piercei, gen. et sp. n., is described from the Philippines as a parasite of the Eumenid wasp, *Rhynchium atrum*, Sauss. The latter is of considerable importance, as it feeds its young entirely on caterpillars.

Winkler (H.). **Verbreitung und Ursache der Parthenogenesis im Pflanzen- und Tierreiche.** [The Occurrence and Cause of Parthenogenesis in the Vegetable and Animal Kingdoms.]—8vo, vi+ 231 pp. Jena, Gustav Fischer, 1920. Price 6.29 *Mks.*

This survey of the existing knowledge of parthenogenesis in plants and animals is compiled from all available works, and includes a section of about 70 pages on insects, arranged in orders and families, the principal facts relating to each species dealt with being noted. An extensive bibliography (pp. 198–222) is given.

Dingler (M.). **Die Hausinsekten und ihre Bekämpfung.** [Household Insects and their Control.]—96 pp., 64 figs. Berlin, Paul Parey, 1925. Price 2 *Mks.*

This is a popular account of the bionomics and control of the principal insect pests that may occur in dwelling houses in Germany.

Notification, no. 897—Agric.—Govt. of India, Dept. Education, Health & Lands. 1 p. typescript. Simla, 24th July 1925.

Unginned cotton may not be imported into India by sea, and cotton seeds only after fumigation with carbon bisulphide and at a prescribed port. Notification, no. 756 [*R.A.E.*, A, xiii, 458] is cancelled.

Beeson (C. F. C.) & Chatterjee (N. C.). **The Economic Importance and Control of the Sal Heartwood Borer** (*Hoplocerambyx spinicornis*, **Newm., fam. Cerambycidae**).—*Indian Forest Records*, xi, pt. viii, 47 pp., 7 pls. Calcutta, 1925.

A detailed summary of this report has already been noticed [*R.A.E.*, A, xii, 550].

Hilson (G. R.), Ramanatha Ayyar (V.) & Chokkalingam Pillai (R.). **Bud and Boll Shedding in Cotton. A Preliminary Enquiry.**—*Agric. Res. Inst. Pusa*, Bull. 156, 34 pp., 6 diagr. Calcutta, 1925.

During these observations, extending over two years, most of the buds and bolls shed were apparently not affected by any pest or disease, whilst of those attacked by insects the chief damage in most cases was done by the spotted bollworms (*Earias* spp.), which produced their greatest effect in the early part of the season and appeared to be largely responsible for the shedding of the early flower-buds. No attempt could be made to determine whether the insect attack was the actual cause of the shedding, or whether the shedding had begun before the attack.

Hutson (J. C.). **Notes on a Caterpillar Pest of Dadap** (*Taragama dorsalis* **Wlk.**).—*Trop. Agriculturist*, lxv, no. 1, pp. 27–32, 5 pls. Peradeniya, July 1925.

During the last three months of 1924 a serious outbreak of *Taragama dorsalis*, Wlk., occurred on an area of dadap (*Erythrina* spp.) shading a 100 acre cacao clearing in the Kandy district. On about 25 acres the trees were entirely stripped and the cacao partly defoliated. All the dadap trees were lopped and the loppings burnt ; and the larvae and cocoons throughout the area were collected and destroyed. Recent

enquiries indicate that the pest has disappeared, but its total eradication can hardly be expected. Under normal conditions it is checked by natural enemies, one of the more important being a wilt disease.

The various stages of *T. dorsalis* are described. The eggs were not found in nature; in the laboratory they were laid in masses on the sides of the breeding-cages and hatched in 12 days. In captivity the larvae are full-grown in from 35 to 43 days. The cocoon is attached to any convenient object, the pupal period lasting about 16 to 24 days under laboratory conditions. The complete life-cycle from egg to egg occupied from 64 to 80 days in the laboratory, whereas in the field under favourable conditions a life-cycle of from 8 to 9 weeks is indicated. Previous observations showed that dadap and *Albizzia* are the preferred food-plants, but tea and rubber may be attacked to some extent after the interplanted trees have been defoliated. Under experimental conditions the young larvae would not feed on these and various other crops, but further experiments are to be made.

DUPORT (L.). **Note sur quelques-unes des recherches poursuivies à la Station entomologique [de Cho-Ganh] du 1er janvier au 31 mars 1925.**—*Sta. ent. Cho-Ganh*, Bull. périodique no. 23, 4 pp. Hanoi, 1925.

The rearing of parasites of *Xylotrechus quadripes*, Chevr. (coffee borer) has continued on the same lines as in previous years, weather conditions being somewhat unfavourable during the first quarter of 1925. Of *Doryctes strioliger*, Kieff., 43,000 were obtained, as against 31,000 during the same period of 1924, and of *Sclerodermus domesticus*, Kieff., 37,000, which is practically the same as in 1924. The Evaniid, *Pristaulacus nigripes*, Kieff., was reared from borers in coffee stems from North Annam, and was liberated on the Cho-Ganh plantation, where it had not previously been found.

Rice stubble was found to be badly infested with *Schoenobius incertellus*, Wlk., and *Sesamia inferens*, Wlk. [*R.A.E.*, A, xiii, 291]. Oviposition occurs on the stems of seedling rice plants. The infested plants are planted out with the others and may be so badly attacked that they do not develop and escape notice; those that are attacked at the moment of blossoming or just after are the only ones to show infestation, but they form only a small percentage of the loss due to these larvae. It is therefore not sufficient to destroy the stalks that show infestation, but the stubble should all be destroyed as soon as possible after the crop is gathered, before the moths can attack the seedlings of the next crop.

Quarantine Proclamation, no. 144.—*Commonw. Australia Gaz.*, no. 55, 1 p. Melbourne, 11th July 1925.

The introduction into Australia of all noxious insects belonging to the family SIRICIDAE is prohibited.

BALLARD (E.). **Some of the Causes of Low-grade Cotton.**—*Queensland Agric. Jl.*, xxiii, pt. 6, pp. 542–545, 2 pls. Brisbane, 1st June 1925.

One of the reasons for cotton being classed as low-grade is staining as a result of internal boll rots, due to fungi, chiefly *Fusarium moniliforme*, and bacteria, which enter when the boll is punctured or similarly

damaged. Such damage may be due to the attacks of *Heliothis obsoleta, Dichocrocis punctiferalis, Earias huegeli, Platyedra gossypiella, Crocidosema* (*Eucosma*) *plebeiana, Tectocoris banksi* or *Dysdercus sidae*. The destructive powers of the last two are often underestimated. *T. banksi* feeds equally readily on the seeds of open bolls, on the green bolls or on the leaves, whereas *D. sidae* is generally found in open bolls, preferring to feed on cotton seed, but once it is attracted to the field it may be found on both ripe and unripe bolls. In experiments in which examples of these species were confined individually with healthy bolls, staining resulted in a large number of cases. It is estimated that the cotton from the attacked bolls would be penalised at least 50 points on the Liverpool market owing to stain alone.

As regards the damage done in nature by *T. banksi*, the estimated number of bugs in one 30 acre field of cotton was 180,000. Of the green bolls 50 per cent. were infected with boll rot, 27 per cent. more with boll rot and *D. punctiferalis* combined, and 6 per cent. with *P. gossypiella*, in some cases together with boll rot.

So far no suitable remedy for the control of *D. sidae* under Queensland conditions has been evolved. Hand collection of all stages of *T. banksi*, including the egg-masses, should be done thoroughly and started early.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric Jl.*, xxiv, pt. 1, pp. 6–8. Brisbane, 1st July 1925.

Experiments in February with paradichlorobenzene show that fumigation may be successfully carried out even in wet weather on well drained land, provided that the sugar-cane is not high enough to maintain constant shade on the ground between the rows. Under these conditions the material remained effective for 9 or 10 weeks.

Various complaints have been received concerning wireworm injury to sugar-cane sets. Calcium cyanide promises to be an effective means of control, but requires further experiments before it can be recommended. Good results have been obtained with baits of rice shorts or rice bran roasted dry and then moistened with water and rolled into small, compact balls, which are placed in the ground about 10 ft. apart. After a week or 10 days they are broken open, the wireworms removed and destroyed, and the balls remoulded and reset. Baits poisoned with arsenicals may be strewn along the bottom of furrows ploughed at regular intervals. Crude naphthalene applied at the rate of 3 cwt. per acre has also been found effective.

Experiments for the control of *Mastotermes darwiniensis*, Frogg., have been continued [*R.A.E.*, A, xiii, 452], including soil injections of calcium cyanide and paradichlorobenzene along the rows of the cane plants. Good results are claimed locally from the use of baits of arsenic and molasses applied to fence posts, logs, stumps, etc., one formula for which is given [*cf.* next paper].

COTTRELL-DORMER (W.). **Cane Pests and Diseases.**—*Queensland Agric. Jl.*, xxiv, pt. 1, pp. 8–11, 1 pl. Brisbane, 1st July 1925.

Mastotermes darwiniensis, Frogg., is recorded from only a few localities as attacking sugar-cane. It occurs chiefly in sandy soils, where it will remain for a great many years without doing appreciable damage to neighbouring sugar-cane growing in heavy soil. A great

deal of guess-work has been employed in the preparation of poison bait for the control of this termite. The correct formula is 4 parts by weight of arsenic to 1 of caustic soda (Q.D.A. formula) [*cf. R.A.E.*, A, xiii, 348]. These are mixed dry and water added gradually until the whole is dissolved. Used in this manner 3 lb. arsenic added to 6 gals. molasses makes a poison bait of ample strength. If the molasses is too thick, 3½ lb. arsenic may be used with 6 gals. molasses and 1 gal. water. Holes are bored into the fence posts, etc., or made with a sharp axe, and 3 or 4 tablespoonfuls of the liquid applied to each post. Though complete eradication is not hoped for, co-operative work of this nature must reduce the destructiveness of the pest to a minimum.

JARVIS (H.). **The Fruit Fly. Report on Measures of Possible Control, 1924-25.**—*Queensland Agric. Jl.*, xxiv, pt. 1, pp. 48–52. Brisbane, 1st July 1925.

During 1924–25 the Department of Agriculture made special efforts to control *Dacus ferrugineus*, F. (*Chaetodacus tryoni*, Frogg.) in the Stanthorpe district, the measures including a proclamation that all fruit (except grapes and tomatos) should be sent out of the granite belt by 7th April; the systematic collection and destruction of fallen and infested fruit; cold storage of fruit prior to its despatch; and destruction of adults by trapping with Harvey's lure. In spite of all these measures fresh infestation occurred. The author is still of opinion that the fly does not pass the winter as a pupa in the granite belt, and that Harvey's lure as it is at present constituted is of very little value for the control of fruit-flies. The infestation in the district under review is mainly derived from the migration of the adult fruit-fly from outside areas.

Notes are given on other fruit-flies, including two new, undescribed ones bred from native fruits.

JARVIS (H.). **Fruit Fly Investigation.**—*Queensland Agric. Jl.*, xxiv, pt. 1, pp. 60–62. Brisbane, 1st July 1925.

A record is given of the hatchings of *Dacus ferrugineus* (*Chaetodacus tryoni*) from late pears and quinces in the insectary during April and May. Five apparently new fruit-fly parasites, 2 Chalcids, 1 Braconid and 2 Ichneumonids, have been secured. *D. ferrugineus* has been bred from various native fruits, notably from that of *Carissa ovata*.

There appears to be every likelihood of *Aphelinus mali*, the parasite of the woolly apple aphis [*Eriosoma lanigerum*], overwintering in all the orchards in which it has been liberated.

HOLDAWAY (F. G.). **Notes on the Oviposition of the Bean Fly.**—*Queensland Agric. Jl.*, xxiv, pt. 1, pp. 62–64, 3 pls. Brisbane, 1st July 1925.

These notes confirm the observations of Jarvis [*R.A.E.*, A, i, 192] as opposed to those of Froggatt [*R.A.E.*, A, x, 611]. At Brisbane during February 1924 eggs of *Agromyza phaseoli*, Coq., were laid only in the leaf tissue of the beans on the upper leaf surface in direct sunlight and during the warm parts of the day. On hatching from the egg the larva mines in the leaf and eventually finds its way to

a vein and thence down to the stems. Pupation usually takes place in the main stem on a level with and just above the surface of the soil, though sometimes in the lateral stems.

EARP (E. A.). **The Wax-moth and its Control.**—*N.Z. Jl. Agric.*, xxxi, no. 1, pp. 26–28, 2 figs. Wellington, 20th July 1925.

Of the two wax moths occurring in bee-hives in New Zealand, *Achroia grisella* and *Galleria mellonella*, the latter is the more destructive. The moths lay their eggs in any place in the hive from which the larvae can find their way to the combs. The larvae prefer the brood combs, burrowing through them under cover of strong silken galleries, which they spin as a protection from the bees.

In the warmer parts of New Zealand, breeding continues throughout the year. The remedial measures recommended are fumigation of the combs with sulphur or carbon bisulphide. Hive-boxes, etc., that have contained infested combs should be treated by scorching corners and crevices with a blow-lamp to destroy any eggs or larvae present.

WILKINSON (H.). **Progress Report on Coffee Mealy Bug,** *Pseudococcus citri*, **Risso.**—*Farmers' Jl.*, vii, no. 30, pp. 9–10 & 29–30. Nairobi, 23rd July 1925.

Pseudococcus citri, Risso, is the most important pest of coffee in Kenya Colony, and for some months past the Department of Agriculture has been making experiments with many spray substances, most of the usual ones failing to pierce the wax coverings of the scales. Kerosene oil was found to volatilise too rapidly at the high altitudes for the oil to penetrate the colonies and solar oil (a heavier distillate of petroleum) and other proprietary oils were then tried with better results. The chief recommendations are to keep the plantations clear of dead leaves and débris, which should be burnt on the spot; the removal of shoots and suckers from the main stem when they are badly infested; and the reduction to a minimum of movement of labour, animals or vehicles from infested to uninfested parts of a plantation. As the numbers of *P. citri* seem to bear a distinct relation to infestation by ants, the stems of all bushes in an infested area should be protected against their migration by a ring of 4 parts of crushed lime to 1 of naphthalene (the mixture requires stirring after rain). Where only a few bushes harbour mealybugs, they should be painted with paraffin or methylated spirit, using only a small quantity to avoid scorching. In cases of light general infestation, solar oil and castor soap emulsion should be used weekly with an ordinary spraying machine until all scales are eradicated. To prepare this, 1 lb. castor soap is dissolved in ½ gal. boiling water and 2 gals. solar oil added while hot, the mixture being pumped back into the container with a coarse-jet pump until a creamy emulsion is obtained. This should be diluted for use to 1 : 25. To make the castor soap, 6 lb. castor oil is heated to about 212° F., and 1 lb. caustic soda dissolved in ½ gal. water is added. Heating is continued until the mixture begins to foam, when the container is immediately removed from the fire; on cooling about 10 lb. of hard soap are obtained. When infestation is heavy, a power spraying machine (at least 200 lb. pressure) must be used. After spraying, steps should be taken to increase the number of natural enemies of the mealybug by collecting and placing them on infested trees. Several

natural enemies occur in Kenya, including eight Coccinellids and a small Psocid. Under favourable conditions the latter may almost clear up an infestation in a few weeks. During rains, however, the insect almost disappears, observations showing that it is drowned in the film of water remaining on the coffee leaf. Attempts are also being made to establish the Coccinellid, *Cryptolaemus moutrouzieri*, Muls., which has already been introduced, and to introduce the Sicilian mealybug parasite [*Tanaomastix abnormis*, Gir.] and certain fungi that have destroyed numbers of Coccids in Florida.

STOREY (H. H.) & BOTTOMLEY (A. M.). **Transmission of a Rosette Disease of the Ground Nut.**—*Nature*, cxvi, no. 2907, pp. 97–98. London, 18th July 1925.

It is generally believed that the rosette disease of ground-nuts (*Arachis hypogea*) belongs to the virus group. This is further confirmed by recent transmission experiments in Pretoria and Durban showing the ability of *Aphis leguminosae*, Theo., to disseminate the disease. When Aphids removed from diseased plants were allowed to feed on mature leaves of healthy plants, the characteristic symptoms appeared afterwards in the young leaves of some of them.

RIPLEY (L. B.). **Experiments with Cutworm Baits: Success with Sodium Fluoride.**—*Union S. Africa Dept. Agric.*, Ent. Mem., no. 3, pp. 5–20. Pretoria, 1925.

The three important cutworms in Natal are *Euxoa segetum*, Schiff., *E. longidentifera*, Hmpsn., and *Polia inferior*, Guen. As the American dry-stuff baits (bran, meal, etc.) are not effective against *E. segetum*, the present investigations were confined to green-stuff baits. The ideal carrier for the bait should have sufficient attraction to be eaten voraciously by any cutworm of an important species, no matter how well it fed on the previous night or upon what kind of food; it must not dry up too quickly even in the sun and without the aid of the moisture-holding properties of sugar; it must have a surface to which the poison easily adheres and over which it will spread uniformly; it must be obtainable at all times of the year when cutworms are injurious; and it must have little or no value otherwise. The poison to be used should be sufficiently toxic to kill all cutworms feeding on it to an extent representing less than one normal night's feeding; it must not repel the cutworms before they have obtained a lethal dose; it must be cheap and easily obtainable; and it must not be dangerously toxic to higher animals. The extensive experiments here described indicated that equal parts by volume of prickly pear and 2 per cent. sodium fluoride solution are the most satisfactory bait. The exact formula and instructions for its preparation have already been noticed [*R.A.E.*, A, xiii, 39].

TUCKER (R. W. E.). **The Black Sand Mite: *Penthaleus destructor*, n.sp.**—*Union S. Africa Dept. Agric.*, Ent. Mem., no. 3, pp. 23–36, 3 pls. Pretoria, 1925.

This is a detailed account of the various stages of *Penthaleus destructor*, sp. n., and its life-history and habits, a shorter account of which has already been noticed [*R.A.E.*, A, xiii, 268].

MUNRO (H. K.). **Biological Notes on South African Trypaneidae (Fruit-flies). I.**—*Union S. Africa Dept. Agric.*, Ent. Mem., no. 3, pp. 39–67. Pretoria, 1925.

A list of some 70 fruit-flies is given, with brief notes on their biology and previous records, and a table showing the species occurring on the various food-plants. Notes on species of economic importance that have not yet been recorded from the Union, as well as instructions for breeding and collecting, are also included.

The subfamily DACINAE is represented by three genera in South Africa, all the species except *Afrodacus biguttulus*, Bez., belonging to *Dacus* and *Tridacus*. There are two more or less distinct biological groups, the one attacking cucurbits and known as pumpkin or melon flies, and the other occurring in the pods of milkweeds (Asclepiadaceae), though some species, particularly *D. brevistylus*, Bez., may attack both. *D. oleae*, Gmel., and *A. biguttulus* infest olives. Young fruits are apparently preferred for oviposition by the species attacking cucurbits. The eggs may be laid so early that the larvae, not having sufficient food, migrate into the plant itself, thus destroying it: nearly or fully mature pumpkins and watermelons may also be infested. In such cases it is possible that the eggs are laid in the cracks of the hard rind. The infested fruit must be soft or broken for the larvae to escape; if unable to do so they may pupate in the fruit, in which case the adults perish.

The larvae of the CERATITINAE usually infest ripe, succulent fruits, the most notorious species being *Ceratitis capitata*, Wied. In general the life-histories are similar. The eggs are laid under the skin of ripe or nearly ripe fruit, and the larvae burrow into the flesh. By the time they are full-grown the fruit usually falls to the ground and the larvae escape, burrowing into the soil for pupation.

The TRYPANEINAE are typically flower-infesting species, none of which can be said to be strictly of economic importance in South Africa, except in so far as some that breed in various weeds limit the possible numbers of their food-plants.

Departmental Activities: Entomology.—*Jl. Dept. Agric. Union S. Africa*, xi, no. 2, pp. 103–105. Pretoria, August 1925.

According to D. Gunn, most of the damage done by fruit-piercing moths in the eastern districts of Cape Province is due to *Achaea lienardi*, the larvae of which were noticed in abundance during April on the native bongesa or monkey apple tree (*Royena pubescens*). These trees were defoliated by millions of caterpillars, and *A. lienardi* was bred from the pupae found in the soil beneath them. The most attractive bait for the moths was prepared from 2 oz. lead arsenate, 3 lb. sugar, 4 fl. oz. grape vinegar and 4 gals. water. As the lead arsenate powder forms a precipitate the tins had to be shaken every morning; it was only necessary to renew the bait once a week. Large tins placed under the trees proved more attractive than smaller ones hung in the trees. To make the bait more attractive oranges were cut in half and dipped for fully a minute in the poison and then placed pulp side up in the tin. Fully 75 per cent. of the moths were attracted to shallow tins.

A larva and a number of egg-capsules of the eucalyptus snout-beetle [*Gonipterus scutellatus*] have been found on *Eucalyptus viminalis* near East London. So far this weevil had been recorded only from Zululand,

but it has been seen in various localities in Natal, and probably occurs over all the Province except the colder parts.

Stomatorrhina lunata, F., is recorded from Cape Province as a parasite of locust eggs, from which it was reared some years ago in Pretoria. It is very abundant locally and destroys large numbers of the eggs.

PETTEY (F. W.). **Codling Moth in Apricots. Preliminary Report on the Biology of the Codling Moth and its Control in Apricots, Wellington, during the 1924-25 Fruit Season.**— *Jl. Dept. Agric. Union S. Africa*, xi, nos. 1–2, pp. 56–65, 137–152, 13 figs. Pretoria, July–August 1925.

Considerable injury to apricots in South Africa has been done by codling moth [*Cydia pomonella*, L.], the infestation in Wellington varying from 5 to 90 per cent. Early ripening varieties appear to be attacked most. Plums may also be attacked. The larvae injure the fruit by burrowing into it as soon as they hatch from the eggs, which are deposited on the fruit. The larvae that hatch early in the season feed in the fruit for about 40 days, those hatching later about 30 days. One larva may attack several apricots. There is no evidence that they burrow into the tips of green apricot twigs, or eat along the veins of apricot leaves, though they may feed on these parts of pear and apple trees. Pupation occurs in a cocoon in any suitable sheltered position in the open or in the store-rooms. The winter is spent in the larval stage in the cocoon, the transformation to the pupal stage occurring in spring, the moth emerging about a week later. The earliest eggs laid in the spring begin to hatch about the 11th October ; therefore a spray to be effective should have been applied before that date. The seasonal history as occurring in 1924 is described. Individuals of the first generation completed their life-cycle in from 60 to 94 days. Some individuals from this generation hibernate, so that there is a comparatively small second generation, which is unable to complete its development in apricots, as most of them are harvested by the end of December. A large number of the larvae succumb to the heat, and it is possible that Wellington conditions approximate to the maximum in which *C. pomonella* can exist. There is practically a one-generation strain of the pest in Wellington apricot orchards, which explains why *C. pomonella* is able to maintain itself year after year.

Where there are no large trees the pest may possibly be controlled by thoroughly scraping off all the loose bark on the branches, trunk and crotches of trees and killing all larvae found during the winter months ; by banding the trees properly by the end of October, and collecting the larvae in the bands regularly every 10 to 14 days from the third week of November until the fruit is picked ; and by regularly picking the wormy fruits and destroying the larvae, beginning on the 1st November and continuing until harvest. Larvae in fruit picked during the harvest should be destroyed the same day. Where these measures are not applicable, such as on large or very old trees, a spray of 1 lb. acid lead arsenate powder in 40 gals. lime-water should be applied during the first or second week of October. The lime-water is prepared by slaking 3 lb. stone lime in a little water and pouring it into the spray tank through a strainer. The spray should be thoroughly applied with a pressure of not less than 150 lb., and nozzles giving a fine, whirling spray. Spraying should be supplemented as much as possible by other measures. One application without lime or two even with lime caused serious scorching of fruit and foliage.

PARNELL (F. R.). **The Breeding of Jassid-resistant Cottons in South Africa.**—*Empire Cotton-growing Corp.*, Repts. Expt. Stas., 1923–1925 (S. Africa), pp. 5–9, London, 1925 ; also with a Memorandum by S. Milligan, in *Jl. Union S. Africa Dept. Agric.*, xi, no. 2, pp. 153–158. Pretoria, August, 1925.

This report summarises the work of cotton-breeding under entomological supervision in the low veld area, extending through the Eastern Transvaal into Zululand, undertaken during 1924-25, the chief object of which was to study the resistance of cotton varieties to the Jassid, *Empoasca* (*Chlorita*) *facialis*. In cases of bad attacks of this pest, the leaves, and in fact the whole plant, dry up considerably, but the growing points may remain alive and be capable of shooting again if the Jassid disappears. As the plant matures, it becomes increasingly susceptible to attack. The damage does not generally become serious until many of the earliest bolls are practically mature, so that a fair crop may be obtained in spite of the pest. Where bollworms have depleted the early crop, however, and Jassids prevent further setting, the position is most serious. No part of the low veld cotton belt of South Africa seems to be free from Jassid attack, more damage apparently being caused in wet seasons than in dry ones. The susceptibility of the different varieties grown is discussed and shown in a table ; the Cambodia variety, from India, is the only one that shows complete immunity. All the resistant varieties are distinctly hairy, though not all hairy ones are necessarily resistant. The resistant plants give the impression of being specially tough and hardy and capable of withstanding any attack better than the average plant. There is every reason for hoping that the Jassid problem will be satisfactorily solved in the near future, thus removing one of the most serious obstacles to the development of cotton-growing in the region under consideration.

SKAIFE (S. H.). **The Fungous Disease of Locusts. Report on a Preliminary Investigation in South-West Africa.**—*Jl. Dept. Agric. Union S. Africa*, xi, no. 2, pp. 179–185, 4 figs. Pretoria, August 1925.

Serious outbreaks of locusts had been expected in South-West Africa in 1925 ; but large numbers were destroyed by the fungus, *Empusa grylli*, and as a result the intended control measures were rendered unnecessary in the northern half of the country. The disease disappeared with the cessation of the rains. Under favourable weather conditions the spores of the fungus germinate very quickly on reaching the locust, pierce the outer skin of the host and enter its body. The spores that do not come in contact with locusts, but strike against the surrounding vegetation or fall to the ground, are not necessarily infective. They germinate and produce a secondary spore, which may in turn infect a locust. All attempts to produce tertiary spores failed. The development of the disease in the locust is described. Death apparently occurs some 5 or 6 days after infection. Locusts in all stages may be attacked, and all short-horned grasshoppers are liable to the disease, but no long-horned grasshoppers have so far been found to be susceptible.

The origin of fresh outbreaks has not been definitely determined, but is probably due to resting spores being produced in the dead locusts and becoming scattered as the bodies decay. Up to the present

it has not been possible to utilise the disease artificially ; it is apparently entirely dependent on weather conditions. Further research, however, may result in the artificial production of the fungus.

Symes (C. B.) & Chorley (J. K.). **Insect Pests of Cotton.**—*Rhodesia Agric. Jl.*, xxii, no. 5, pp. 541–561, 4 pls. ; also [S. Rhodesia] *Minist. Agric. & Lands*, Bull. 548, 23 pp., 4 pls. Salisbury, August 1925.

This paper is a reprint of an earlier one [*R.A.E.*, A, xii, 320] by Symes, with additional notes by Chorley, who considers that of the 27 insects that have now been recorded on cotton in Southern Rhodesia very few are likely to develop into pests of importance.

Vuillet (J.). **Note sur un insecte nuisible au cacaoyer dans l'Ouest-Africain** *Adoretus hirtellus* **Castn.** (**Rutelidae**).—*Bull. Com. Etudes hist. & sci. Afr. Occid. Fr.*, viii, no. 2, pp. 313–317. Paris, April-June 1925.

Young cacao plants were almost completely destroyed by the Rutelid, *Adoretus hirtellus*, Castn., in parts of the Ivory Coast of French West Africa. Previous literature concerning this species is reviewed [*R.A.E.*, A, ii, 59, 107]. In one area under discussion it chiefly attacked cacao and kola [*Cola acuminata*], and though various forest trees were also infested, it could not be considered as a serious pest of *Elaeis*. It is particularly injurious to young cacao trees growing in the open, indicating the need of shade trees in these plantations. It is suggested that the measure recommended by Preuss for the control of Melolonthid larvae [*R.A.E.*, A, xiii, 53] might be of value against *A. hirtellus*.

Feytaud (J.). **Le traitement arsenical contre les Otiorhynques.**—*Rev. Zool. agric. & app.*, xxiv, no. 4, pp. 76–82, 2 figs. Bordeaux, April 1925.

Since the good results obtained by the Defence Syndicate of St.-Pierre-d'Oléron against *Otiorrhynchus sulcatus*, F. [*R.A.E.*, A, v, 40] the campaign against this pest has been relaxed to such an extent that the numbers in 1923 were again increasing to an alarming degree. Collections were again resorted to, but the infestation was much more scattered than formerly and the Syndicate had not sufficient funds. In addition, therefore, to the former methods of protecting and propagating the natural enemies, and of collecting the adults, the establishment of a barrage zone around infested vineyards, which should be sprayed with copper sulphate every week from 1st June to 15th August, was suggested, but unfortunately was not maintained. Experiments were then made to determine the effect of arsenicals on the weevils. The substances used were a 2 per cent. solution of American lead arsenate paste (containing about 50 per cent. water) and a 4 per cent. solution of diplumbic arsenate (containing 75 per cent. water), that is, in both cases, about 1 per cent. of the dry arsenate. These, sprayed on foliage on which the weevils fed, killed them all within 5 days. The same result was obtained, though more slowly, with half the strength of diplumbic arsenate and with a 5 per mille solution of calcium arsenate paste. When applied before blossoming, these insecticides will at the same time be efficacious against the various vine moths, and they can also be combined with Bordeaux mixture against mildew.

Feytaud (J.). **Les traitements insecticides contre l'Eudémis et la Cochylis. L'arseniate de plomb.**—*Rev. Zool. agric. & app.*, xxiv, no. 4, pp. 73–76. Bordeaux, April 1925.

The use of arsenicals against the vine moths [*Polychrosis botrana*, Schiff., and *Clysia ambiguella*, Hb.] in France is described, and the diplumbic and triplumbic forms of the poison are discussed. Both give good results, the former being preferred [*cf. R.A.E.*, A, xi, 399]; but it is only in the spring, against the first generation of larvae, that this poison can be used.

Paillot (A.) & Faure (Jean C.). **Utilisation sur place de la récolte de Pyrèthre.**—*Rev. Zool. agric. & app.*, xxiv, no. 4, pp. 82–84. Bordeaux, April 1925.

This is a slightly more detailed account of the preparation of pyrethrum as an insecticide than one previously noticed [*R.A.E.*, A, xii, 10].

Trabut (—). **La fourmi d'Argentine,** *Iridomyrmex humilis* **var.** *arrogans.*—*Bull. agric. Alg.-Tun.-Maroc*, xxxi, no. 8, pp. 173–178, 1 fig. Algiers, August 1925.

There is a constant traffic between Algiers and the French Riviera in ornamental plants, very many of which are infested with *Iridomyrmex humilis* (Argentine ant), and in view of the difficulty of detecting the presence of this pest a certificate is not considered a sufficient guarantee of freedom from infestation. Workers have already been introduced into Algeria in this manner on many occasions, but without a queen they do not constitute a serious menace. The queens emerge from the nests in June, and it is during the summer that they may be transported on fruit or vegetables or in soil. As precautionary measures, no product capable of harbouring queens should be imported from an infested area, and a strict inspection should be maintained for unrecorded centres of infestation. In view of the great difficulty in finding a queen ant in the soil of a potted plant, each plant should be taken out of its pot and fumigated on importation at Algiers.

Should a colony become established, it would be possible to eradicate it by prompt action. All the breeding-places should be traced, and, as this ant tends to congregate in separate groups, facilities should be given for the formation of such groups in places that can be easily treated with carbon bisulphide, remembering that the queens must be destroyed. It is sometimes possible to poison them by offering baits containing weak doses of arsenicals, which the workers carry to the queens. They quickly recognise a noxious substance, however, and prevent other ants from touching it. The work of the Defence Syndicate in the Maritime Alps in limiting the areas of infestation is described, and if a colony should be discovered in Algiers, the finder is asked to notify the Algerian Horticultural Inspection Department. A description of the ant is given.

Maillet (C.). **La mouche des oranges.**—*Rev. agric. Afr. N.*, xxiii, no. 314, pp. 524–529, 6 figs. Algiers, 7th August 1925.

A general account is given of *Ceratitis capitata*, Wied. (Mediterranean fruit-fly) and the measures used for its control in various countries.

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HAUTEFEUILLE (L.). **Travaux anglo-indiens sur la Gomme-laque.**—*Rev. Bot. app. & Agric. colon.*, v, no. 47, pp. 509–514. Paris, July 1925.

This is a review of existing literature, augmented by personal observations, on the production of lac by *Laccifer* (*Carteria*) *lacca*.

KOPP (A.). **La mosaïque de la canne à sucre. Son apparition aux Antilles françaises. Quelques faits nouveaux.**—*Rev. Bot. app. & Agric. colon.*, v, nos. 46 & 47, pp. 411–417 & 519–526. Paris, June & July 1925.

Recent observations on sugar-cane mosaic in the French West Indies have shown that several different diseases are grouped under this heading. In this connection existing literature on the occurrence of the disease and its control is reviewed. The author considers that infection by the agency of *Aphis maidis* cannot be the only means by which the disease is transmitted.

Moyens de lutte contre les fourmis.—*Terre vaudoise*, xvii, no. 33, pp. 490–491. Lausanne, 15th August 1925.

This is a summary of the principal methods of dealing with ants.

SCHWÖRER (—). **Verheerendes Auftreten des Getreidehähnchens (*Lema cyanella* L.).** [A devastating Occurrence of *L. cyanella*.]—*Badische Bl. für Schädlingsbekämpf.*, i, no. 5, pp. 67–68. Freiburg i. Br., June 1925.

The Chrysomelid beetle, *Lema cyanella*, L., caused considerable injury to oats in Baden in June 1925, several fields being completely destroyed. This pest is seldom reported in Germany, but is quite common in Hungary, and the measures adopted there were employed, namely, spraying with a solution of 2 lb. tobacco extract in 10 gals. water. Only about 3 per cent. of the larvae survived this treatment. The application must be made during a 2–3 day spell of dry weather when the larvae are young. The effect of the spray can be increased by adding 2 lb. of slaked lime.

RUDY (H.). **Die Flugzeuge im Dienste der Bekämpfung landwirtschaftlich-schädlicher Insekten im Staatsgebiete der SSSR.** [Aeroplanes in the Service of Work against Agricultural Insect Pests in the Territory of the S.S.S.R.]—*Badische Bl. für Schädlingsbekämpf.*, i, no. 5, pp. 68–70. Freiburg i. Br., June 1925.

Large-scale experiments on the use of aeroplanes as a means of distributing poison dusts were made in Russian Turkestan in 1924. A machine flying at 50–100 ft. above the ground can dust about 28,000 square yards in an hour, this time including stops for replenishing the dust containers. *Locusta migratoria*, L., the chief pest in these regions, breeds in inaccessible marshy areas, and the use of aeroplanes supplies the solution of the problem of destroying it.

Buss (—). **Der Maiskolbenwurm** (*Heliothis armigera* **Hb.**). [The Maize Cob Worm, *H. obsoleta.*]—*Badische Bl. für Schädlingsbekämpf.*, i, no. 5, pp. 70–71. Freiburg i. Br., June 1925.

In recent years maize in all parts of Germany and particularly in Baden has been very severely injured by *Heliothis obsoleta* (*armigera*). Autumn ploughing for the destruction of the pupae, early sowing and crop rotation are the measures recommended.

Merkblatt über die Zerstörung von Telegraphenstangen durch Käferlarven. [Notice on the Destruction of Telegraph Posts by Beetle Larvae.]—*Badische Bl. für Schädlingsbekämpf.*, i, no. 5, pp. 71–72. Freiburg i. Br., June 1925.

The German Ministry of Posts and Telegraphs has issued a notice giving brief information on a Cerambycid beetle boring in telegraph posts. The species appears to be *Hylotrupes bajulus*, L. The presence of the pest is usually revealed by the exit-holes of the young adults. Oviposition takes place from mid-June to early August, the eggs being deposited in cracks. The larval period requires at least 2–3 years. Coniferous timber is chiefly attacked, and the infestation is particularly marked in poles with cracks extending to a greater depth than the zone impregnated with creosote.

Rudy (H.). **Die Wanderheuschrecke, *Locusta migratoria* L., phasa *migratoria* L., et phasa *danica* L.,** [The Migratory Locust.]—*Badische Bl. für Schädlingsbekämpf.*, Sonderbeilage, 34 pp., 3 pls. Freiburg i. Br., July 1925.

This is the first part of a proposed monograph on *Locusta migratoria*, L., and includes two chapters. The first deals with ancient representations of locusts, such as those on coins, etc. The second presents a chronological survey of the literature dealing with both mass appearances and isolated records of *Locusta migratoria* in the Rhine region and in Valais, the principal conclusion arrived at being that the invasions have their source in Eastern Europe, and that the main routes of invasions are along the Main and the upper reaches of the Danube. Some localities in Western Europe proved to be suitable for supporting more or less constant colonies of locusts, these being always inundation areas of big rivers with the typical flora of *Phragmites*, *Typha*, etc. The periodicity of mass outbreaks of locusts in the Rhine region is connected with xerothermic climatic periods, but owing to various secondary influences the locust periods do not always exactly synchronise with Brückner's climatic periods of 35 years.

Vayssière (P.). **Le problème acridien.**—*Matériaux Étude des Calamités*, i, no. 4, pp. 361–372 ; ii, no. 5, pp. 67–74. Geneva, April–June 1925.

This is a summary of information on the present state of the locust problem in different countries, the bulk of which has already been noticed.

RÉTHLY (A.). **Les calamités naturelles en Hongrie de 930 à 1876**—*Matériaux Étude des Calamités*, i, no. 4, pp. 373–378; ii, no. 5, pp. 77–78. Geneva, 1925.

This is a chronological and classified list of natural disasters that have occurred in Hungary from 930 to 1876 A.D., including outbreaks of locusts, cockchafers, and caterpillars.

WIEGAND (A.). **Bestrijding van koperwormen met behulp van kainiet.** [The Control of Wireworms with Kainit.]—*Deutsche landw. Presse.* (Translated in *Tijdschr. Plantenziekten*, xxxi, no. 9, pp. 213–215. Wageningen, September 1925.)

An effective control for the infestation of beet fields by wireworms is provided by working finely-ground kainit into the soil. About 540 lb. is required per acre. The ground must then be watered, unless rain falls.

PAOLI (G.). **La fumaggine o morfea e le irrorazioni di melassa agli olivi.** [Sooty Fungus and the Spraying of Olive Trees with Molasses.]—*Riv. Ligure d'Agric.*, iv, no. 6–7, reprint, 4 pp. Genoa, June–July 1925.

Examination of olive trees affected by sooty fungus showed this to be due to sugary material produced by insects or by the trees themselves. The molasses used for sweetening the poison-spray employed against the olive fly [*Dacus oleae*] is not responsible.

MACDOUGALL (R. S.). **Insect Pests of 1924.**—*Trans. Highland & Agric. Soc. Scotland*, 1925, reprint 27 pp., 37 figs. [Edinburgh] 1925.

The recent discovery of *Leptinotarsa decemlineata* (Colorado potato beetle) in France and its occurrence in the United States are reviewed, and the danger of its importation into Great Britain is pointed out.

An account is given of *Lepidosaphes ulmi* (apple mussel scale), with recommendations for its control, including instructions for the preparation of Woburn winter wash and paraffin-oil emulsion. The formula for the former is ½ lb. iron sulphate, ¼ lb. lime, 2 lb. caustic soda, 5 pints paraffin and 10 gals. water. A modified oil emulsion, to allow application at the time the eggs hatch in case there has been no winter treatment, is 2 pints paraffin, 1 lb. soft soap and 10 gals. water. This should be applied in June.

The Scolytid, *Hylesinus crenatus* (black ash bark-beetle), occurs on older ash trees with thick bark, unhealthy dying trees being chosen for the brood galleries. The larvae pupate at the end of their tunnels, the pupal bed lying to a great extent in the bark. This species is sometimes confused with *H. fraxini* (variegated ash bark-beetle), which is abundant in England but less common in Scotland. A key is given for the determination of these two species. *Myelophilus piniperda* (pine shoot beetle) is a troublesome pest of pine, and occurs more rarely on spruce and larch. The length of the life-cycle from egg to adult varies with the temperature and material on which the larvae are working; from 90 to 100 days may be taken as a summer average. The length of the cycle is important, as the pest is destroyed by trap trees or logs, which must be barked before the exit of the new generation.

The newly emerged adults tunnel in the young shoots in the crown before mating occurs. As a result of this damage the young shoots are blown down or wither away, while the brood galleries, if numerous, ring the stem and interfere with the passage of sap. A series of traps should be prepared from the spring onwards to autumn; when the bark is removed in due time, it should be burned with the larvae in it. The galleries of *Ips typographus* in spruce are discussed. *Xyloterus* (*Trypodendron*) *lineatus* bores through the bark and right into the sapwood of felled stems and stumps of spruce, Scots pine [*Pinus sylvestris*] and larch, while *X.* (*T.*) *domesticus* attacks felled deciduous trees, such as birch, oak and beech, in a similar manner. The galleries are described. The larvae feed on a fungus, which develops on the sap in the borings.

Meligethes aeneus frequently occurs in great numbers on both wild and cultivated crucifers. The eggs are laid in the opening buds; the larvae feed on the blossom and drop to the ground for pupation. The most satisfactory remedial measure is to shake the insects into a receptacle, in which they are killed with boiling water.

A foreign cockroach, probably *Panchlora viridis*, was received on two occasions, presumably imported on bunches of bananas. Leather-jackets [Tipulid larvae] have been particularly injurious in various localities. Paris green 4 lb. and bran 56 lb., thoroughly mixed and damped sufficiently to make the poison adhere to the bran without making the bran lumpy, proved an effective remedy against these pests. It should be broadcast over the surface of the ground, this amount being sufficient for an acre. The West of Scotland Agricultural Department recommends 1 lb. Paris green to 30 lb. bran or thirds and 2 gals. water as sufficient for 1 acre. Two teacups of treacle added to the water renders the bait more attractive. The mixture should be applied at or before the first sign of attack.

Lefroy (H. M.). **The Death-watch Beetle.**—8 pp., 3 figs. London, Society of Antiquaries [1925].

The death-watch beetle, *Xestobium rufovillosum*, DeG. (*tessellatum*, Ol.), makes tunnels in oak, and in deal when in contact with oak, in buildings. Damage is confined chiefly to ill-ventilated places. The female lays eggs, up to about 80, in cracks or on the surface of the wood, and the larvae burrow into it, making extensive honeycomb tunnels. Late in the third summer they pupate near the surface and become adult in the autumn, though the beetles do not leave the wood until the spring.

Chrystal (R. N.). **The Genus *Dreyfusia* (Order Hemiptera, Family Chermesidae) in Britain, and its Relation to the Silver Fir.**—*Phil. Trans. R. Soc. London*, Ser. B, ccxiv, pp. 29–61, 5 pls. London, 1st September 1925.

Two species of *Chermes* (*Dreyfusia*) occur in Britain, *C. nüsslini*, Börn., and *C. piceae*, Ratz. The life-history of the former was studied partly on a young tree of *Abies nordmanniana* growing in Kew Gardens and partly on nursery plants of *A. pectinata* from Argyllshire. In January the hibernating sistens larvae were concentrated in numbers on the young twigs, close to, and even sometimes on, the buds. In a greenhouse their development began early in February, and the first stem-mothers matured and oviposited on 23rd February. Oviposition was

general by 28th February, and the first spring larvae hatched on 14th March. In the open, development began about 23rd February, the first stem-mothers appearing on 15th March, after which oviposition proceeded rapidly, both under cover and in the open. The first spring larvae appeared in the open on 16th April. These larvae were mostly of the progrediens type, the others being sistentes, which migrated to the bark and, on settling down, assumed the hibernating form. Soon after hatching the progredientes began to feed on the needles. On 9th May they had reached a fourth stage, and the presence of nymphal forms, indicating a winged stage, was observed. These were few in number, but were present both in greenhouses and in the open. The first fully developed winged forms appeared on 14th May, and, in order to determine to what food-plant these would migrate, young silver firs (*Abies* spp.), Norway spruce (*Picea excelsa*) and oriental spruce (*P. orientalis*) were enclosed with them in cages. They settled on the last-named tree and laid eggs that hatched about 28th June, and gave rise to sexual forms. Unfortunately these could not be reared to maturity. Their numbers were very small, and experience at Kew showed that this generation may not always occur. The indications are that when *P. orientalis* is not present, the summer winged forms will settle on *P. excelsa* or other species of spruce, but that they cannot successfully complete their life-cycle on these trees. The experiments at Kew confirmed Marchal's findings, that the winged forms of *C. nüsslini* are exclusively sexuparae, and that there are no non-migrating alatae that could carry the infestation from one silver fir to another in any given area. Side by side with the nymphs of the sexuparae, progredientes were observed developing on the needles. These pass through 5 stages ; the first stem-mothers were observed ovipositing on 1st June, and the first larvae emerged from these eggs in June and proved to be of the sistens type, seeking the bark of the young shoots and assuming the typical, hibernating sistens form. As stated above, this form had begun to separate out in the spring generation, and its numbers were always being added to throughout the summer. Late in June some of these larvae were observed to begin feeding again, and by mid-July had begun oviposition. These are the "aestivo-sistentes" described by Marchal. Young larvae from their eggs settled upon the bark with the sistentes of former generations and passed the winter in this condition.

C. piceae has been found commonly at Kew on *Abies cilicica, A. cephalonica, A. forresti, A. pindrow, A. grandis, A. nobilis, A. firma, A. fraseri,* and *A. faxoniana.* On trees from the nursery stage up to about 10 ft. in height the attack is confined to the older bark and branches, or the buds and nodes of young branches, on which it causes gall-like swellings. The galled twig may cease to grow in length, but the galled portions increase in diameter and become knob-like, with the dead tip of the shoot protruding beyond. With this species the young branches are almost entirely free from attack, the winter larvae developing either on the buds or on the thicker bark of the main stem and older branches. Cholodkovsky (1903) proposed the name *C.* (*Dreyfusia*) *piceae* var. *bouvieri* for the gall-producing form, but this name was not adopted by either Börner or Marchal, and the author's experience tends to indicate that it is the tree species and not the insect species that is the factor determining gall formation. Winter larvae (sistens) of *C. piceae* were first examined on 26th January on *A. forresti* growing in the open, when they were in the first stage and

showed no sign of development. In early February development began in the greenhouse, and by the 24th the first stem-mothers were ovipositing, activity being general by 3rd March. Development began in the open in late February, and on 6th March stem-mothers with eggs were found on *A. grandis*. The first larvae (progredientes) appeared on 20th March, migrated to the needles and settled there. These larvae, both indoors and out, failed to develop, and no further sign of a progrediens generation occurred. It was therefore impossible to compare these forms with Marchal's account of the species in France, where the progrediens generation is dimorphic, giving rise to both winged and wingless forms. The former develop into non-migrating alatae, show well-defined morphological differences from the sexuparae of *C. nüsslini*, and settle not on a spruce, but on another silver fir, on the needles of which they oviposit and give rise to a sistens generation. The wingless stem-mothers of the progrediens generation remain on the original silver fir and lay a few eggs on the needles or in an axillary position on the shoot where they give rise to a further series of sistens larvae. At Kew, after the appearance of the first progrediens larvae, all those subsequently appearing were of the sistens form ; these returned to the buds again and remained as undeveloped sistentes for a time. In some cases activity was resumed later in the summer, the larvae developing into a generation of aestivo-sistentes stem-mothers on the buds, laying eggs and producing a further progeny of sistens forms, destined to overwinter on the buds of silver fir. The cycle of development in this species during the present experiments has therefore been confined to parthenogenetic generations on silver fir.

The effects of the feeding of *C. nüsslini* upon the tissues is to cause malformation, which, beginning in the bud, causes the xylem or conducting tissue to be suppressed, often to a considerable degree, both in the main stem and also in the leaf-trace bundles. The tree then suffers from insufficiency of water. A second source of injury to the plant doubtless arises from the fact that food substances are continually being removed by the insect, but this is probably the less important of the two. Out of four generations of young larvae, the stem is the chosen feeding-place of three, so that there is an overwhelming concentration of larvae on the young stems and buds, with the result that serious damage is done at the growing points. Experiment showed that in the space of 2½ months a considerable amount of deformation can take place. *A. pectinata* and *A. nordmanniana* are the two species of silver fir that show the worst effects from *C. nüsslini*. In other species, such as *A. grandis* and *A. nobilis*, the injury is confined to the buds, and this type of damage has in the past been attributed to *C. piceae* var. *bouvieri*. Whether this subdivision of the genus into several species is biologically sound is doubtful in the author's opinion, but it is clear that the factors at work causing deformation are virtually similar in the case of each of these species of trees. It is probable that in trees of the *A. grandis* type the localisation of attack on the buds and older portions of the stem is influenced by some factor possibly inherent in the plant, the nature of which is obscure. The fact that *C. nüsslini* when placed on *A. grandis* produces the *C. piceae* type of deformation suggests that the two forms may be, as Nüsslin believed, only biological races.

C. nüsslini pierces the tissue at the junction between two epidermal cells, the stylet passing down the middle lamella of the cell walls. The course of the stylet is intercellular throughout, and round the stylet

there is formed a sheath, which remains in the tissue after the stylet tube has been withdrawn. Micro-chemical tests indicate that the stylet sheath is composed, at least in part, of substances of a proteid nature. The cells of the affected tissue are abnormally large, show much thickened walls, dense proteid contents, and an enlarged nucleus. The nuclei of those cells that lie near to the path of the stylet are seen in many cases lying on the disc of the cell nearest to the stylet. The area of abnormal tissue in the stem spreads gradually and restricts the passage of water through the stem. The cambial cells are also prevented in most cases from functioning normally. *C. nüsslini* is the sole cause of the appearance of this abnormal tissue, which begins to form very soon after the insects have settled on the young shoots in spring, and increases in area as the summer advances. Healthy young plants can, of course, withstand attack longer than weakly ones, but it is only a matter of time until any plant succumbs.

BARNES (H. F.). **The Ecological Distribution of Adult Crane-flies in Carnarvonshire.**—*Jl. Ecology*, xiii, no. 1, pp. 138–148, 1 fig. Cambridge, January 1925. [Received 3rd October 1925.]

The occurrence of crane-flies in Carnarvonshire, with reference to such factors as geographical features, suitable habitats, relative humidity and meteorological conditions, is discussed.

GRAM (E.) & ROSTRUP (S.). **Oversigt over Sygdomme hos Landbrugets og Havebrugets Kulturplanter i 1924.** [Report on Plant Diseases and Pests in Denmark in 1924.]—*Tidsskr. f. Planteavl*, xxxi, pp. 353–417. Copenhagen, 1925. (With a Summary in English.)

The Nematode, *Heterodera schachtii* var. *avenae*, was particularly injurious where oats were grown at short intervals in the rotation. Other cereal pests included *Hadena basilinea* and *Hylemyia coarctata*, on wheat, and *Oscinella* (*Oscinis*) *frit*, on late-sown oats.

On beet, *Pegomyia hyoscyami* was very injurious, and *Aphis rumicis* (*papaveris*) was rather harmful in July and August. *Thrips angusticeps* injured swedes in May, and the weevil, *Ceuthorrhynchus quadridens*, attacked the leaves severely; the larvae of *C. assimilis* and of the midge, *Perrisia* (*Dasyneura*) *brassicae* were injurious to the seed, *Meligethes aeneus* being of less importance. *Plutella maculipennis* (*cruciferarum*), *Pieris brassicae* and *Contarinia nasturtii* also attacked swedes as well as cabbages, though the most important pest of the latter was *Phorbia* (*Chortophila*) *brassicae*. On carrots, *Trioza viridula*, causing leaf-curl, was a serious pest in some places, but *Psila rosae* was effectively repelled by green tar oil (1 part to 99 dry slaked lime). The celery leaf-miner, *Acidia heraclei*, was very harmful in July; and *Lygus pabulinus* was abundant from June to August on potatoes. Clover pests were the Nematode, *Tylenchus dipsaci* (*devastatrix*), and the weevil, *Sitona lineata*. Some uncultivated meadows were devastated by *Charaeas graminis* (antler moth). *Psylla mali*, *Hoplocampa testudinea* and *Cheimatobia brumata* infested apples, and *Ametastegia glabrata* (dock sawfly) was a new pest of this fruit. The larvae of *Argyresthia ephippiella* seriously affected the cherry harvest. Early spraying with a very fine mist of nicotine proved effective against the larvae of *Oxygrapha* (*Acalla*) *comariana*, infesting strawberry leaves.

In tests of various insecticides, nicotine (2 per mille and 1 per cent. soap) was effective against Pierid larvae (75 per cent. killed). A Dutch carbolineum product (Carbokrimp) proved successful against the eggs of *Psylla mali* and *Argyresthia ephippiella*.

TULLGREN (A.). **Aphidologische Studien. II.**—*Medd. Centralanst. försöks. jordbruks.*, no. 280 (Ent. avdel. no. 44), 70 pp., 41 figs. Stockholm, 1925.

This paper discusses modern developments in the classification of Aphids with reference to the work of other authors [*cf. R.A.E.*, A, viii, 502, etc.]. The anatomy and biology of a number of species are discussed, including *Pachypappa grandis*, sp. n., and *Gootiella tremulae*, gen. et sp. n., both on *Populus tremula* in Sweden. The FORDINAE and ANOECIINAE as defined by Van der Goot are discussed in detail.

LUNDBLAD (O.) & LINDBLOM (A.). **Selleriflugan, *Philophylla* (*Acidia*) *heraclei* L., som skadedjur i Sverige.** [The Celery Fly, *A. heraclei*, as a Pest in Sweden.]—*Medd. Centralanst. försöks. jordbruks.*, no. 283 (Ent. avdel. no. 45), 25 pp., 21 figs. Stockholm, 1925. (With a Summary in German.)

Acidia (*Philophylla*) *heraclei*, L., is fairly common in Sweden, but it was only in 1923 that it was recorded as a pest. The egg, larva, and pupa are described. The only plants known to be attacked in Sweden are celery and parsnip. The eggs are laid on the lower surface of the leaves, incubation occupying 10–12 days. Two generations a year occur. Pupation takes place underground in the majority of cases, only 18 per cent. of the larvae pupating at the surface. The only parasites observed were the Braconid, *Blacus exilis*, Nees, and the Chalcids, *Halticoptera smaragdina*, Curtis, and an undescribed species of *Derostenus*. Spraying with a 1–2 per mille solution of nicotine sulphate showed good results, as the majority of both the larvae and pupae were killed by it.

TULLGREN (A.). **Om dvärgstriten (*Cicadula sexnotata*, Fall.) och några andra ekonomiskt viktiga stritar.** [*C. sexnotata* and some other Jassids of Economic Importance.]—*Medd. Centralanst. försöks. jordbruks.*, no. 287 (Ent. avdel. no. 46), pp. 1–71, 34 figs., 1 pl., Stockholm, 1925. (With a Summary in German.)

LINDBLOM (A.). [Supplement i.] **En undersökning av dvärgstrithärjningens 1918 utbredning och styrka inom Södermanlands och Östergötlands län samt en approximativ beräkning av de genom densamma föranledda ekonomiska förlusterna.** [An Investigation on the Distribution and Importance of Jassid Injury in 1918 in Södermanland and East Gothland, with an approximate Calculation of the resultant Losses.]—*Ibidem*, pp. 73–78, 2 maps.

AHLBERG (O.). [Supplement ii.] **Zikaden-Parasiten unter den Strepsiptera und Hymenopteren.** [Strepsipterous and Hymenopterous Parasites of Homoptera.]—*Ibidem*, pp. 79–86, 6 figs.

In the summer of 1918, winter wheat in some Swedish provinces was severely attacked by Jassids, particularly *Cicadula sexnotata*, Fall.,

with which was associated *Deltocephalus striatus*, L., while some others, such as *Thamnotettix sulphurellus*, Zett., and *T. tenuis*, Germ., also occurred in numbers. *C. sexnotata* and *D. striatus* appear to have two generations a year in Sweden, with perhaps a third in a dry year. In 1918 (as also in 1915, when the same injury to wheat was observed) the weather was very dry. The measures advocated include careful supervision of the fields in order to detect the first signs of infestation. If an incipient infestation is discovered, it can be checked by catching the insects, by rolling or ploughing, or by spraying with solutions of nicotine. Once an infestation has developed there is nothing to be done but thoroughly to cultivate the soil at the appropriate time.

The Delphacid, *Delphax pellucida*, F., attacked oats in 1922, the injury resembling that by the Jassids, but it is not of great economic importance. It has one generation a year, usually extending from mid-summer to mid-summer. The larvae hibernate, generally in the third stage. Two other Jassids, *Eupteryx atropunctata*, Goeze, and *Empoasca* (*Chlorita*) *flavescens*, F., did some injury to potato and beet respectively. A detailed description of the external genitalia of these two species is given, and it is suggested that *E. flavescens*, recorded as a dangerous pest of tea in eastern Asia, may be a distinct species.

The parasites described are a Strepsipteron, *Elenchinus delphacophilus*, sp. n., from *D. pellucens*; the Chalcids, *Mormoniella oviphaga*, sp. n., from eggs of *D. pellucida*, and *Oligosita engelharti*, Kryger, from eggs of *C. sexnotata*; and the Mymarids, *Gonatocerus radiculatus*, sp. n., and *Anagrus atomus*, L., from the eggs of *C. notata*.

Kemner (N. A.). **Betflugan** (*Pegomyia hyoscyami* **Pz.**) **och det stora betflugangreppet 1924.** [The Beet-fly, *P. hyoscyami*, and the great Beet-fly Outbreak of 1924.]—*Medd. Centralanst. försöks. jordbruks.*, no. 288 (Ent. avdel. no. 47), 56 pp., 12 figs. Stockholm, 1925. (With a Summary in German.)

The beet-fly, *Pegomyia hyoscyami*, Pz., was particularly harmful in Sweden in 1924, there having been a gradual increase of this pest from 1918 to 1923. In northern Sweden, spinach, red beet and fodder beet were infested, while in the south, sugar-beet was chiefly attacked, the injury being increased by retarded sowing owing to the late spring and unfavourable weather in early summer. In July the fly decreased in numbers, and the plants recovered to some extent. The second generation was of no importance. In some districts there was a direct crop loss of over 1 ton per acre.

The various stages of *P. hyoscyami* are described. The eggs are laid singly or in batches up to 12. Incubation takes 2–3 days. The larval stage lasts 10–12 days, and the pupal stage 18–32. Pupation usually occurs in the ground at a slight depth. The adult can emerge from a depth of 19 inches, so that deep ploughing does not prevent emergence. There are 2–3 generations a year, but they are not distinct, all stages being found contemporaneously.

The parasites bred in 1924 were *Opius nitidulator*, Nees, *O. fulvicollis*, Thoms., *O. wesmaeli*, Hal., and a new species, *O. betae*, Bengtsson. These parasites are, however, not of economic importance, though *Trichogramma evanescens*, Westw., parasitised more than 50 per cent. of the eggs near Stockholm. Early sowing and careful cultivation are excellent preventives, and deep ploughing in autumn may be of

value by bringing the pupae nearer the surface. Experimentally, spraying with 1–2 per mille of nicotine sulphate after thinning out the plants gave good results against the larvae.

KRIEG (—). **Die Bekämpfung forstlicher Schädlinge durch Abwurf von Calziumarseniate vom Flugzeug.** [The Control of Forest Pests by Dusting with Calcium Arsenate from Aeroplanes.]—*Anz. Schädlingsk.*, i, no. 9, pp. 97–98. Berlin, 1925.

A severe outbreak of the pine-moth [*Panolis flammea*] in Germany in 1924 was followed early in 1925 by a threatening outbreak of the nun moth [*Lymantria monacha*], and an experiment of dusting from aeroplanes was undertaken. Calcium arsenate dust was the insecticide chosen, as it needs no admixture of other chemicals to prevent scorching, has a high toxic content, and adheres well. The aeroplane passes at a height of 12–60 feet above the tree-tops and dusts a strip about 1½ miles long by 80–120 yards wide. A forest of about 600 acres of mixed trees required 38 such strips, about 26 lb. of dust being used per acre in the case of spruce. This amount could be reduced by one-sixth for high stands and by one-third for low stands of pines, and as the nun moth is comparatively resistant to insecticides, might be further reduced for other insects.

Examinations carried out after dusting showed that all the caterpillars died in 5–6 days. No injurious effects were observed on game or birds. A warning was issued against picking and eating berries or mushrooms in the treated area.

WOLFF (M.) & KRAUSSE (A.). **Die Einführung der Arsenverstäubung vom Flugzeug aus in die Praxis der Forstschädlingsbekämpfung.** [The Introduction into the Practice of Forest Pest Control of the Method of Dusting with Arsenic from Aeroplanes.]—*Anz. Schädlingsk.*, i, no. 9, pp. 99–100. With a Note by K. ESCHERICH, pp. 100–101. Berlin, 1925.

In this account of the introduction into German forestry practice of dusting with arsenical insecticides from aeroplanes, various instances are quoted, including the one described in the preceding abstract. A note by Dr. Escherich gives some additional data.

LEHMANN (H.). **Neue Betrachtungen zur Frage der Obstmadenfallen (Fanggürtel).** [New Considerations on the Question of Band Traps for the Larvae of *Cydia pomonella*.]—*Anz. Schädlingsk.*, i, no. 9, pp. 101–103. Berlin, 1925.

This paper quotes evidence from various sources to show that the actual net result of banding for *Cydia pomonella* is to reduce the numbers of larvae by 10–12 per cent., which is considered to be of no practical value. The observations of growers, that banding alone is not a satisfactory remedy, are thus confirmed. The general use in Germany of arsenical sprays for this moth is recommended.

PRELL (H.). **Ueber *Apanteles solitarius* Ratz. als Parasit der Nonnenraupen.** [On *A. solitarius* as a Parasite of Nun Moth Larvae.]—*Anz. Schädlingsk.*, i, no. 9, pp. 103–105, 2 figs. Berlin, 1925.

In view of the near relationship of the gipsy moth [*Porthetria dispar*] to the nun moth [*Lymantria monacha*] and of the fact, recorded by

Ratzeburg, that the Braconid, *Apanteles solitarius*, Ratz., parasitises both moths, observations were made at Tharandt to see if this parasite and *A. melanoscelus*, Ratz. (the species imported into America against the gipsy moth) occurred regularly in both, and whether *A. melanoscelus* now predominated in the nun moth. *A. solitarius* was, however, found to be the parasite of the nun moth, while another species, possibly *A. melanoscelus*, was obtained from the gipsy moth. *A. solitarius* has two generations a year like *A. melanoscelus*. The young nun moth caterpillars are the hosts of the spring generation; the hosts of the second generation are not known, but it is possible that old larvae of the nun moth may be parasitised. *A. solitarius* is a valuable parasite of this pest, especially as it attacks it so early, long before the chief feeding period. *A. difficilis*, Nees, a polyphagous species, was also bred from the nun moth at Tharandt.

Andres (A.). **Zur Biologie von** *Dermestes frischi* **Kugel. (Speckkäfer.)** [The Biology of *D. frischi* (Lard Beetles).]—*Anz. Schädlingsk.*, i, no. 9, pp. 105–106. Berlin, 1925.

In breeding experiments with *Dermestes frischi*, Kug., carried out at a temperature of 28–30° C. [82·4–86° F.], eggs laid on 14th October hatched in 2 days. Pupation began between 7th and 10th November, the first adults emerging on the 15th. Total development, at this high temperature, therefore took 31–32 days. Though the beetles mated, oviposition was not observed, and they had all died by 14th January. It is possible that in nature reproduction is suspended until the following spring. It was found that 0·5 per cent. by volume of hydrocyanic acid gas kills all stages of this beetle.

Morstatt (H.). **Weitere Mitteilungen über** *Aphelinus mali* **Hald.** [Further Communications on *A. mali*.]—*Anz. Schädlingsk.*, i, no. 9, pp. 106–107. Berlin, 1925.

This article reproduces the information given by Stenton in a paper already noticed [*R.A.E.*, A, xiii, 424].

Vayssière (P.). **Un insecticide peu connu.**—*Rev. Hist. nat. appl.*, (1) vi, no. 8, pp. 254–256. Paris, August 1925.

The value of paradichlorobenzene as an insecticide has been proved, and its importance is increasing rapidly. Its use in fumigation and for soil disinfection is discussed, and several examples of its successful employment against various pests in different countries are cited.

Feytaud (J.). **Pourquoi et comment il faut anéantir le Doryphore.**—*Rev. Zool. agric. & appl.*, xxiv, no. 6, pp. 117–125, 5 figs. Bordeaux, June 1925.

A general account is given of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say] and of the present situation with regard to its presence in France. The necessity for prompt action as soon as infestation is discovered is pointed out, and the best remedial measures, according to the degree or nature of the infestation, are indicated [*R.A.E.*, A, xi, 232, etc.].

Rivière (G.) & Pichard (G.). **Le lithiase des poires.**—*Jl. Soc. Nat. Hortic. France*, xxvi, pp. 370–371. Paris, August 1925.

Damage to pears, the skin of which was punctured with small, round holes, has been traced to a Capsid bug, *Calocoris fulvomaculatus*, DeG. Although the bug has not actually been observed feeding, it evidently pierces the skin of the fruit and sucks the juices that exude without making any effort to suck the fruit itself.

Chevalier (L.). *Pemphredon lugubris* **Latr. Hymenoptère mangeur de Pucerons.**—*Bull. Soc. Sci. Seine & Oise*, (2) vi, no. 5, pp. 69–72. Versailles, 1925.

The Sphegid, *Pemphredon lugubris*, L., common near Paris, fills the cells of its nest with the larvae of Aphids as food for its young.

La lutte contre le phylloxéra.—*Ann. agric. Suisse*, xxvi, pp. 434–437. Berne, 1925.

Large sums are still spent in Switzerland against *Phylloxera*, not in the hope of exterminating it from the vineyards, but merely in order to limit its spread and to keep hitherto uninfested vineyards free from its attack. The present distribution of this Aphid is discussed. A large part of the expenditure is made in the form of a federal subsidy for the purpose of reconstructing infested vineyards with grafted American resistant stock, the figures for recent years being given.

Lutte contre les ennemis des plantes cultivées.—*Ann. agric. Suisse*, xxvi, pp. 456–457. Berne, 1925.

During the War and the following years the Federal Government of Switzerland paid high premiums for the collection of cockchafers in good condition that could be used as food for poultry. During 1918–20, some £5,000 was spent in this way. In consequence of a severe outbreak of the cabbage butterfly [*Pieris brassicae*, L.] in 1917, over £1,000 was paid out for its destruction.

Seda (A.). **Zavíječ kukuřičný.** [*Pyrausta nubilalis*, Hb.]—*Ochrana Rostlin*, v, no. 3, pp. 33–36, 4 figs. Prague, September 1925.

Considerable injury to maize has been caused by *Pyrausta nubilalis*, Hb., in Czechoslovakia. An account is given of its seasonal history and the usual cultural methods of control.

Zimmermann (F.). **Pokusy s hubením mšice chmelové.** [Experiments for the Control of the Hop Aphids.]—*Ochrana Rostlin*, v, no. 3, pp. 36–37. Prague, September 1925.

Of the various preparations that have been tried for the control of Aphids attacking hops in Czechoslovakia, the most satisfactory is a nicotine solution with the addition of ½ per cent. nitro-benzol resin soap. Various proprietary insecticides are discussed.

Svec (F.). **Choroby a škůdci karafiátů.** [Pests and Diseases of Carnations.]—*Ochrana Rostlin*, v, no. 3, pp. 37–41. Prague, September 1925.

This is a summary of the more important pests and diseases of carnations, with brief notes as to their occurrence and control. The principal European pests are the mites, *Tetranychus telarius*, L. (*althaeae*, v. Hanst.) and *Pediculopsis graminum*, Reut., the Aphid, *Myzus* (*Rhopalosiphum*) *persicae*, Sulz. (*dianthi*, Schr.), and the flies, *Hylemyia cardui*, Meig., *H. antiqua*, Meig., and *H. nigrescens*, Rond.

Smolak (J.). **Zpráva o činnosti stanice pro choroby rostlin při st. vyšší škole ovocnicko-vinařské a zahradnické na Mělníce za rok 1923 a 1924.** [Report of the Activities of the Station of Plant Diseases at Melnik for 1923–1924.]—*Ochrana Rostlin*, v, no. 3, pp. 41–46, 1 fig., 1 map. Prague, September 1925.

The pests recorded include the Nematodes, *Aphelenchus omeroides* on the leaves of *Pteris* sp. and *A. olesistus* on the leaves of *Begonia rex*; *Blennocampa pusilla* and *Clinodiplosis oculiperda* on roses; *Psylla buxi* on box; *Eriophyes loewi* on lilac; *Epitrimerus pyri* on pears; *Acrolepia assectella* on onions; *Gracilaria roscipennella* on walnuts; *Acidia heraclei* on celery; *Crioceris lilii* on bulbs; *Phorbia* (*Chortophila*) *brassicae* on cabbages; and *Hylemyia antiqua* on onions.

[Baranov (N. I.).] **Баранов (Н. И.).** *Blaesoxypha lineata* **Fall., как паразит** *Dociostaurus maroccanus* **Thunb.** [*B. lineata* as a Parasite of *D. maroccanus*.]—*Défense des Plantes*, ii, no. 3, pp. 130–138, 6 figs. Leningrad, June 1925.

This information has already been noticed from another source [*R.A.E.*, A, xiii, 98].

[Zorin (P. V.).] **Зорин (П. В.). К биологии** *Apanteles gabrielis* **Gaut. et Riel.** [On the Biology of *A. gabrielis*, Gaut. & Riel.]—*Défense des Plantes*, ii, no. 3, pp. 138–147, 10 figs. Leningrad, June 1925.

Apanteles gabrielis, Gaut. & Riel, hibernates in a cocoon inside that of its host, *Phlyctaenia* (*Pionea*) *forficalis*, L., infesting cabbages, and emerges about the same time, though if kept at temperatures of 23°–26° C. [73·4–78·8° F.], the adults of *P. forficalis* appear in 5–6 weeks and those of the parasite in 3–4 weeks. Larvae developed normally from unfertilised eggs under laboratory conditions. The act of oviposition and the development of the larva are described. During very warm weather the larval parasite emerges from the caterpillar and pupates in a cocoon on the leaf at the site of its emergence, but in colder weather the host caterpillar enters the soil for pupation still harbouring the parasite. Consequently, under the conditions in northern Russia, only one complete generation a year is normally produced [*cf. R.A.E.*, A, viii, 120]. Parasitised caterpillars may live for 4 or 5 days after the emergence of the parasite. Those that have entered the soil for pupation usually leave their cocoons and appear on

the surface just before the parasites emerge. The duration of the life-cycle from egg to adult at room temperatures of 17–19° C. [62·6–66·2° F.] varied from 30 to 40 days, but at 30–31° C. [86–87·8° F.] was only 14 to 18 days. At over 20° C. [68° F.] one generation after another is produced without the occurrence of any larval resting stage. Parasites have been bred and liberated so that they may attack *P. forficalis* earlier than the parasites emerging in nature, but the full economic value of this cannot yet be ascertained.

[Meier (N. F.).] **Мейер (Н. Ф.). Несколько слов о биологии** *Angitia fenestralis* **Holmgr. (Ichneumonidae) и об иммунитете у насекомых. (Предварительное сообщение).** [A Few Words on the Biology of *A. fenestralis*, Holmgr., and on Immunity in Insects.]—*Défense des Plantes*, ii, no. 3, pp. 147–150, 4 figs. Leningrad, June 1925.

Angitia fenestralis, Holmgr., is a parasite of various Microlepidoptera, especially *Plutella maculipennis*, Curt., *Sparganothis pilleriana*, Schiff., *Clysia* (*Cochylis*) *ambiguella*, Hb., *Polychrosis botrana*, Schiff., and all species of *Hyponomeuta* (*Yponomeuta*).

Near Leningrad it is most easily bred from *P. maculipennis*. Its development is described. Though it will attack the host larvae in all stages and is able to breed throughout the year, it does not completely control its host. It will not oviposit in all larvae, and some of the eggs deposited do not develop, as in some larvae they become surrounded by the tissues of the host and perish. This apparent immunity of certain larvae has also been observed by the author in connection with the eggs of *Exetastes cinctipes*, Retz.

[Predtetchenski (S. A.).] **Предтеченский (С. А.). К изучению азиатской саранчи** *Locusta migratoria* **L. в Средней России.** [On the Study of the Asiatic Locust, *L. migratoria*, L., in Central Russia.]—*Défense des Plantes*, ii, no. 3, pp. 151–153. Leningrad, June 1925.

The author has made extensive studies on the Asiatic locust (*Locusta migratoria*) under the conditions obtaining in Central Russia, where an outbreak occurred during 1920–1923 in the provinces of Riazan, Penza, and Tambov. He has also collected all the information relative to previous outbreaks of locusts in these, their most northern, breeding grounds, but is only able at present to publish a brief summary of his results.

This locust is indigenous in all provinces of Central Russia, but it is only in certain localities that it appears periodically (1890–93, 1897–99, 1920–22) in vast numbers, and this indicates a connection with regular breeding grounds. These are concentrated in two areas, one in the basin of the upper Dnieper and the other in that of the Oka, in both cases amongst forests on the warm and dry soils of relatively recent clearings. This points to the fact that the appearance of the breeding grounds in Central Russia has occurred in historical times and is connected with the partial defoliation by man of the areas concerned. In the region studied, the locust is obviously occurring under unfavourable conditions of temperature and moisture, the isotherm of 14° C. [57·2° F.] for the vegetative period representing the northern limit of its mass appearance. The years that are most

favourable to the development of locusts are those with the warmest and driest summer and with a short, cold autumn. Such conditions hasten the metamorphosis and increase reproduction. Unfavourable years are characterised by a cool and moist summer, which delays the metamorphosis, and a long, warm autumn, which causes a large percentage of eggs to be destroyed by fungi.

Other factors that limit the increase of locusts are parasitic Sarcophagid flies, particularly *Blaesoxipha lineata*, Fall., which destroys both larvae and adults, and a Bombyliid, *Systoechus* sp., which destroys the eggs. Other natural enemies are of little economic importance; but the migration of flying swarms from the breeding grounds, with subsequent egg-laying in unfavourable localities, must be regarded as one of the factors limiting the mass development of locusts. Unfavourable conditions of existence in Central Russia are responsible for the local form being somewhat smaller than that from the typical southern breeding grounds, though all the main proportions of various parts of the body are the same.

Observations during 1920–24 confirmed Uvarov's theory of phases. The swarming phase appears as a result of a series of favourable years, and reaches its climax in the year following two years of drought; meteorological conditions are not, however, directly responsible for its appearance. After a critical year and as a result of the scattered egg-laying, the progeny of the swarming phase undergoes a transformation into the solitary phase [*L. migratoria* ph. *danica*, L.].

[Predtetchenski (S. A.).] **Предтеченский (С. А.). К фауне саранчевых бассейна реки Мокши в Средней России.** [The Locust Fauna of the Moksha River Basin in Central Russia.]—*Défense des Plantes*, ii, no. 3, pp. 153–154. Leningrad, June 1925.

This list is compiled from collections made during 1922–24, and includes brief notes as to the habitat and seasonal occurrence of locusts.

[Tarbinski (S. P.).] **Тарбинский (С. П.). К фауне прямокрылых Кустанайской губернии.** [The Orthopterous Fauna of the Kustanai Government.]—*Défense des Plantes*, ii, no. 3, pp. 155–159. Leningrad, June 1925.

This is a list of 57 species found in the Kustanai Government (formerly Turgai, Asia). This region forms the southern boundary for certain northern species and the northern boundary for some of the southern species.

[Veber (Ia. Kh.).] **Вебер (Я. Х.). Опыт обследования зернохранилищ для выяснения зараженности их вредителями хлебных продуктов.** [An Investigation of Grain Stores to ascertain the Extent of their Infestation by Grain Pests.]—*Défense des Plantes*, ii, no. 3, pp. 159–162. Leningrad, June 1925.

As a result of an examination of some 200 different grain stores in Omsk, the pests found were *Ptinus* sp., *Tyroglyphus farinae*, Koch, *Sitotroga cerealella*, Ol., *Tenebrio molitor*, L., *Calandra granaria*, L., and a Dermestid. The first two were most abundant.

[Korab (I. I.).] **Кораб (И. И.). Культура гороха в связи с повреждаемостью его гороховой зерновкой, *Laria pisi* L. Дополнительные сведения о гороховой зерновке—*Laria pisi* L., по наблюдениям в 1923 г.** [The Cultivation of Peas in Relation to their Infestation by *Bruchus pisorum*, L. Additional Information on *B. pisorum* from Observations made in 1923.]—**Бюлл. Сортов.-Семен. Управл. Сахаротреста, 1923,** no. 7, pp. 111–120. Kiev, 1924. (Abstract in *Défense des Plantes*, ii, no. 3, pp. 188–189. Leningrad, June 1925.)

Experiments with different varieties of peas indicate a definite relation between infestation by *Bruchus pisorum*, L. (*Laria pisi*, L.), and the date of sowing and duration of the growing period of the plants. It is recommended that the late varieties should be sown at the end of April, the early ones as early as possible, *i.e.*, the end of March; in either case they will escape infestation. An account is given of the egg-parasite, *Bruchoctonus senex*, Grese, which destroyed 60 per cent. of the eggs of this Bruchid.

[Vasina (A.).] **Васина (А.). Капустная муха (*Hylemyia brassicae*). К вопросу о мерах борьбы с нею.** [*Phorbia brassicae*, Bch., and its Control.]—**Сад и Огород. Изд. Российского О-ва Любителей Садоводст. Московск. Губернск. Кооперативн. Товарищество садоводов,** no. 1, pp. 19–23. Moscow, 1925. (Abstract in *Défense des Plantes*, ii, no. 3, pp. 189–190. Leningrad, June 1925.)

From a review of the literature and experiments made at the Moscow Plant Protection Station, the application of mercury bichloride (1 part by weight to 1,000 of water) is recommended for the control of *Phorbia* (*Hylemyia*) *brassicae*, Bch. The cabbages should be watered until the soil around them is evenly wetted to a depth of just over 21 inches.

[Wilkinson (D. S.).] **Entomology.**—*Cyprus: Ann. Rept. Dir. Agric. 1924*, pp. 5 & 12. Nicosia, 1925.

In consequence of the marked increase in the numbers of *Platyedra* (*Gelechia*) *gossypiella* and *Earias insulana* on cotton an order was issued that within infested areas in Cyprus all cotton plants should be pulled up and burnt before a certain date. A few tents from Egypt have been imported for the fumigation of *Citrus* trees against Coccids. Other pests important enough to require attention are *Thaumetopoea wilkinsoni*, Tams (processionary moth of the pine), and a Chalcid, *Eurytoma amygdali*, infesting almonds, as well as various apple pests. It is hoped to introduce parasites of the potato moth, *Phthorimaea operculella* (*Lita solanella*), from France, and perhaps also parasites of *Ceratitis capitata* (Mediterranean fruit-fly) from America.

Malloch (J. R.). **Some Indian Species of the Dipterous Genus *Atherigona*, Rondani.**—*Mem. Dept. Agric. India*, Ent. Ser., viii, no. 11, pp. 111–122, 13 figs. Calcutta, April 1925. [Received 14th September 1925.]

Until recently the species of *Atherigona* were thought to be harmless, the known larvae feeding on decaying vegetables and fruits, but it has now been discovered that many Indian species are destructive to cereals, grasses, and other plants. The new species described include

A. atripalpis, the larvae boring in *Setaria italica* ; *A. oryzae* boring in rice ; *A. eriochloae* boring in *Eriochloa polystachya* ; *A. miliaceae* boring in *Panicum miliaceum* (millet) ; and *A. approximata* boring in stems of cumbu [*Pennisetum typhoideum*]. A key is given to the Indian species of the genus, based mostly on the males.

RAMACHANDRA RAO (Y.). **A Short Note on the Habits and Food Plants of some of the Indian Species of *Atherigona* described by Mr. Malloch.**—*Mem. Dept. Agric. India*, Ent. Ser., viii, no. 11, pp. 123–125. Calcutta, April 1925. [Received 14th September 1925.]

This note forms an appendix to the previous paper. The species of *Atherigona* fall into two distinct groups, those breeding mostly in rotting organic matter and those boring into the stems of plants, mostly grasses, and causing the death of their central shoots. In the phytophagous forms the larvae bore into the central shoots of grasses and sever their connection with the growing point at their base ; they then turn back and feed on the decaying core of the shoots. Pupation may occur in the stem or in the soil. They are restricted to particular species of millets or grasses, one breeding in *Sorghum*, another in rice, etc. The larvae of the subgenus *Acritochaeta*, represented by *Atherigona excisa*, feed only in rotting fruits or vegetation and assume the rôle of scavengers. The known records as to food-habits and distribution of the species described by Malloch are appended.

RAMAKRISHNA AYYAR (T. V.). **The Nim Mealy Scale (*Pulvinaria maxima*, Green).**—*Mem. Dept. Agric. India*, Ent. Ser., viii, no. 12, pp. 127–155, 5 pls., 14 figs. Calcutta, April 1925. [Received 14th September 1925.]

Pulvinaria maxima, Green, causes considerable injury to nim trees (*Melia azadirachta*) in some parts of South India, particularly in the upland tracts of Coimbatore, Salem, Mysore, etc. It is apparently confined to the tropics and has also been found in South India on mulberry, grape-vine, *Zizyphus jujuba*, *Coccinea indica*, cotton, *Acalypha bicolor* and *Jatropa curcas*. It was originally recorded from Java on *Erythrina*, but it has not yet been found on these trees in South India. Though isolated plants in fields of cotton are occasionally covered with the scale, it has not yet occured as a serious pest of this crop. Green's original description of the species is quoted with supplementary remarks.

On badly infested trees of *M. azadirachta* almost all the different stages of the scale can be found at the same time. The average number of eggs in each egg-mass ranges from 650 to 900, and they are generally deposited on a broad surface, such as a leaf or stout shoot. One generation occupies on the average $6\frac{1}{2}$–8 weeks, the length of the various stages being 12–14 days for the eggs and 4–5 weeks for the larvae up to the emergence of the males and another week up to the time of oviposition. Under normal conditions 6 or 7 generations may thus be produced in the year, though owing to various influences, such as climate and natural enemies, the scale may suddenly become scarce. Predacious enemies include the Coccinellid, *Scymnus coccivora*, Ayyar, and the Noctuid, *Eublemma scitula*, Ramb. The latter also attacks *Laccifer* (*Tachardia*) *lacca*, Kerr, and *Anomalococcus indicus*, Green, and is itself parasitised by the Braconid, *Aphrastobracon flavipennis*, Ashm.,

not previously recorded from India. Other natural enemies of *P. maxima* are Chalcids, Dipterous larvae and the larvae of *Chrysopa* sp.

Remedial measures should be adopted before the scale becomes too abundant, and consist of pruning the infested branches, followed by spraying with a contact insecticide, such as fish-oil resin soap at a strength of 1 lb. to 8 gallons of water. The spray should be repeated after an interval of 2 weeks.

Other scales that may become serious pests of the nim tree are *Lepidosaphes meliae*, Green, and *Parlatoria camelliae*, Comst.

Sonan (J.). **Four Injurious Cerambycids in Formosa.**—*Formosan Agric. Rev.*, xix, no. 9, pp. 770–780. Taihoku, September 1925. (In Japanese.)

In Formosa 10 injurious species of Cerambycids have hitherto been known. To these are now added :—*Monochamus tesserula*, White, very injurious to pines in Taihoku and apparently having one generation a year ; *Stromatium longicorne*, Newm., infesting wooden houses and tools ; and *Cerambyx cantori*, Hope, and *Priotyrannus closteroides*, Thomson, both pests of *Citrus*.

Sonan (J.). **On three Ichneumonid Flies.**—*Trans. Formosan Nat. Hist. Soc.*, xiv, no. 75, pp. 93–101. Taihoku, December 1924. (In Japanese.)

Acanthostoma insidiator, Smith, is recorded from Formosa, where it is parasitic upon *Caligula japonica*, Moore, *Antheraea pernyi*, Guér., and *A. pernyi* var. *yamamai*, Guér. *A. japonicum*, Kriechb., is a synonym of it.

Takahashi (R.). **Some Chinese Aphididae.**—*Trans. Formosan Nat. Hist. Soc.*, xv, no. 78, pp. 103–104. Taihoku, July 1925. (In Japanese.)

The following Aphids, collected at Soochow, Kiangsu, are recorded for the first time from China : *Macrosiphum granarium*, Kirby, on wheat ; *M. gobonis*, Mats., on *Cirsium* sp. ; *M. tanacetarium*, Koch, on *Artemisia vulgaris* var. *indica* ; *Aphis* (*Rhopalosiphum*) *avenae*, F., and *A. maidis*, Fitch, on grasses ; and *Tuberolachnus viminalis*, Boy., on *Salix* sp. *Toxoptera punjabipyri*, Das, from India is regarded as a synonym of *T. pyricola*, Mats., injurious to the pear tree in Japan.

Takahashi (R.). **Aphididae of Formosa. Part 4.**—*Dept. Agric. Govt. Res. Inst., Formosa*, Rept. 16, 74 pp., 4 pls. Taihoku, July 1925.

In former reports 142 species of Aphids have been recorded from Formosa, and to these 39 more species have now been added. Of these the following are new : *Macrosiphum itoe*, on *Rhododendron lasiostylum* ; *Matsumuraja formosana*, on *Rubus* sp. ; *Myzus montanus*, on *Astilbe longicarpa* ; *Amphorophora viburni*, on *Viburnum arboricolum* ; *A. katoi*, on *Polydium ellipticum* ; *Greenidea tattakana*, on *Quercus serrata*, *Q. stenophylloides* and *Castanea formosana* ; *G. myricae*, on *Myrica rubra* ; *G. mangiferae*, on mango (*Mangifera indica*) ; *G. mushana*, on *Quercus* sp ; *Myzocallis mushensis*, on *Zelkowa formosana* ;

Dilachnus orientalis and *D. formosanus*, on *Pinus*; *D. taiwanus*, on *Tsuga formosana*; *Lachnus niitakayamensis*, on an unknown plant, probably a conifer; *Stomaphis liquidambarus*, on *Liquidambar formosana*; *Oregma tattakana*, on *Arundinaria niitakayamensis*; *Ceratophis bambusifoliae*, on bamboo (*Bambusa*); *Aleurodaphis mikaniae*, on *Mikania scandens*; and *Formosaphis micheliae*, on *Michelia longifolia*.

Notes are given on the known predators of these Aphids, and the author has collected a number of parasites, including the Braconids, *Lysiphlebus japonicus*, Ashm., infesting *Macrosiphum neoartemisae*, Tak., and *Toxoptera aurantii*, Boy.; *Diaeretus nipponensis*, Vier., infesting *Greenidea ficicola*, Tak., and *Rhopalosiphum pseudobrassicae*, Davis; *Ephedrus japonicus*, Ashm., infesting *Aphis rumicis*, L., and *Brachysiphoniella gramini*, Tak.; and *Aphidius ervi*, Hal., infesting *Macrosiphum* sp. The Chalcid, *Pachyneuron siphonophorae*, Ashm., has been bred from *Macrosiphum formosanum*, Tak.

Anatomical and biological data are given on many of the species new to the island, with a food-plant catalogue of the Formosan Aphids, which includes some 260 species of plants belonging to 179 genera. Although the Aphid fauna of Formosa appears to resemble greatly that of Japan, it is thought that it will be found eventually to be still more closely related to that of southern Asia.

Uye (T.). **Life-history of** *Vesiculaphis caricis* **Fullaway (Aphididae).**—*Insect World*, xxix, nos. 7 & 8, pp. 218–223 & 254–260, 2 pls. Gifu, July & August 1925. (In Japanese.)

Vesiculaphis caricis, Full., passes the winter on *Rhododendron* spp. in Japan, and occurs on *Cyperus* spp. in the summer. The eggs on the winter food-plants hatch from the middle to the end of March. The stem-mothers are apterous and produce winged viviparous females, which migrate to the summer food-plants from the end of April to the middle of May. Many generations occur on the latter, and are composed of both winged and wingless forms. Winged sexuparae appear from the end of October to the middle of November and return to the winter food-plants to produce apterous oviparous females. Winged males, which are produced on the summer food-plants from the end of November, return to the winter ones. *Toxoptera rhododendroni*, Uye, and *T. shichito*, Uye, are synonyms of this species.

Kuwayama (S.), Kuribayashi (K.) & Oshima (K.). **Insects and Fungi injurious to the Sugar-beet and the preventive Methods.**—*Hokkaido Agric. Expt. Sta.*, Bull. 36, pp. 1–138, 3 pls. Sapporo, May 1925. (In Japanese.)

More than 30 insects are known to be injurious to sugar-beet in Hokkaido. Notes are given on the morphology, life-history and habits of the more important pests, *viz.*: Collembola, *Smynthurus hortensis*, Fitch; Lepidoptera, *Barathra brassicae*, L., *Agrotis* (*Rhyacia*) *c-nigrum*, L., *Euxoa segetum*, Schiff., *Polia illoba*, Butl., *Zinckenia fasciata*, Cram., and *Pyrausta nubilalis*, Hb.; Coleoptera, *Chaetocnema chalceola*, Jac., *Phyllotreta sinuata*, Redt., *Serica salebrosa*, Brenske, *Cassida nebulosa*, L., and *Luperodes nigripennis*, Motsh., var. *discrepans*, Baly; and Rhynchota, *Tuponia guttula*, Mats., *Lygus kalmi*, L., and *Myzus persicae*, Sulz.

DE JONG (A. W. K.). **Verslag** [Report] **van den Directeur van het Algemeen Proefstation der A.V.R.O.S., 1 Juli 1924 - 30 Juni 1925.**—*Meded. Algem. Proefst. A.V.R.O.S.*, Algem. Ser. no. 22, 30 pp. Medan, 1925.

On one estate about 750 acres of oil palms [*Elaeis guineënsis*] were attacked by a Limacodid, *Orthocraspeda trima*, Mo., but this moth soon disappeared in consequence of a fungous disease. In one instance coffee was severely injured by *Xyleborus coffeae*, Wurth. Coconuts were attacked by *Artona* (*Brachartona*) *catoxantha*, Hmps. Attempts to breed the parasite [*Prorops nasuta*, Wtrst.] of the coffee-berry borer [*Stephanoderes hampei*, Ferr.], obtained from Malang [*R.A.E.*, A, xiii, 467] failed, possibly owing to the heat at Medan, but further trials are being made at a higher elevation.

SOUTH (F. W.). **Annual Report of the Chief Field Officer, 1924.**—*Malayan Agric. Jl.*, xiii, no. 7, pp. 189–202. Kuala Lumpur, July 1925.

Routine work for the control of *Oryctes rhinoceros*, L., and *Rhynchophorus schach*, Ol., on coconuts was maintained. Small outbreaks of *Artona* (*Brachartona*) *catoxantha*, Hmps., occurred locally in the first half of the year, but were controlled by natural enemies. *Hidari irava*, Mo., and *Plesispa reichei*, Chap., also did some damage to coconut. *Leptocorisa* spp. attacked rice early in the year. *Spodoptera mauritia*, Boisd., destroyed 100 acres of newly planted rice in Perak, but practically no damage was done when the area was replanted. *Nymphula depunctalis*, Gn., threatened to do considerable harm to rice seedlings, and *Sylepta derogata*, F., attacked trial plots of a strain of Egyptian cotton, but both were controlled by hand-picking. *Nephotettix bipunctatus*, F., was recorded as a minor rice pest in Johore.

GATER (B. A. R.). **Annual Report of the Entomological Division for 1924.**—*Malayan Agric. Jl.*, xiii, no. 7, pp. 220–226. Kuala Lumpur, July 1925.

There were several outbreaks of *Artona catoxantha*, Hmps., on coconuts, and work was concentrated on the parasites of this insect, the most important being a Tachinid, *Ptychomyia remota*, Ald., from which, however, hyperparasites have been recorded. Attempts at keeping the pupae in cold storage for any length of time failed. Coconuts and oil-palms [*Elaeis guineënsis*] were also attacked by *Hidari thrax*, Hb., which was eventually controlled by parasites. *Plesispa reichei*, Chap., did some damage to young coconut palms, and additional insects on oil-palms were *Anomala dorsalis*, F., *Aleurocanthus gateri*, Corb., and *Setora nitens*, Wlk. Several unidentified Limacodids were found feeding on the leaves, and a Lymantriid caterpillar on the young fruit. Rice was attacked by *Spodoptera mauritia*, Boisd., *Leptocorisa* spp., and *Cnaphalocrocis medinalis*, Guen. A species of *Catantops*, probably *C. splendens*, Thunb., did some damage to budded rubber.

The Coleoptera, *Adoretus compressus*, Weber, and *Autoserica* sp. were found on *Terminalia catappa* and *Isoptera borneensis*; *Hypomeces squamosus*, F., damaged a large variety of plants, especially kapok [*Eriodendron anfractuosum*]; *Cylas formicarius*, F., was present in

sweet potatoes; *Apriona flavescens*, Kaup., was found boring in *Artocarpus polyhemia* as well as in jak fruit [*A. integrifolia*]; and a Cerambycid, *Stromatium longicorne*, Newm., did considerable damage to timber in a building.

Tobacco suffered severely from *Heliothis flavigera*, Hmps., *Phthorimaea heliopa*, Low., and the Pyralid, *Psara submarginalis*, Swinh., which is also found on lettuce and cabbage. *Stomopteryx subsecivella*, Zell., and the larvae of a species of *Agromyza*, probably *A. sojae*, Zehnt., were found on soy beans [*Glycine hispida*]. The eggs of the latter are laid in the stems of the seedling beans and hatch in about 5 days. All the larvae died in captivity; the pupal period lasts 8 days. The larvae of *Phragmatoecia castaneae*, Hb., were found on sugar-cane, especially ratoon crops. More cases of damage from Coccids were observed than in previous years, and *Saissetia nigra*, Nietn., was common on rubber, cotton and *Croton*.

The following Lepidoptera were found feeding on derris leaves:—*Hasora alexis*, F., *Amsacta lactinea*, Cram., *Anisodes obrinaria*, Gn., *Belippa laleana*, Moore, *Striglina scitaria*, Wlk., *Maruca amboinalis*, Feld., *Lamprosema diemenalis*, Gn., *Eucosma defensa*, Meyr., and *E. balanoptycha*, Meyr. *Epilachna indica*, Muls., caused considerable damage to egg-plants [*Solanum melongena*], *Datura* spp., French beans and cucurbits, and has also been found on rubber. Under laboratory conditions, the total life-cycle lasted 39 days from egg to adult. *E. vigintioctopunctata*, F., var. *pubescens*, Hope, was recorded on ladies' fingers [*Hibiscus esculentus*], and *Piezodorus rubrofasciatus*, F., on *Sesbania aculeata* and *Cajanus indicus*, the total life-cycle from egg to adult being 32 days. *Creatonotus transiens*, Wlk., is an occasional pest of ragi [*Eleusine coracana*], vanilla and ground-nut [*Arachis*]. Eggs hatched after 5 days, the larval period varying from 27 to 35 days and the pupal from 6 to 9. *Brithys crini*, F., was found on *Zephyranthes*, and subsequently on beans. Oviposition took place two days after emergence, the eggs hatching in 6 days, the larval and pupal periods being from 18 to 22 days and 11 days respectively. *Nygmia scintillans*, Wlk., was found on many plants, including vanilla, dadap [*Erythrina*], cowpeas, soy beans, and cabbage. The eggs hatch in five days, the larval and pupal stages occupying 18 and 9 days respectively.

GATER (B. A. R.). **Insects on African Oil-palms.**—*Malayan Agric. Jl.*, xiii, no. 8, pp. 250–256. Kuala Lumpur, August 1925.

Whereas the pests of oil-palms [*Elaeis guineënsis*] are much the same as those of coconuts, several are found only on the former. Insect pests in other countries are briefly reviewed. Those recorded in Malaya include *Oryctes rhinoceros*, L., *Rhynchophorus schach*, Oliv., *Setora nitens*, Wlk., *Mahasena* sp., *Amathusia phidippus*, L., *Anomala dorsalis*, F., and *Oregma nipae*, v.d.G. The larvae of an undetermined Lymantriid were found feeding on the female flowers and young nuts, and in the laboratory were observed partly to penetrate the flowers. In captivity a female laid 53 infertile eggs, the pupal period being from 4 to 6 days. The male resembles *Orgyia turbata*, Butl.

Whereas the number of oil-palm pests in West Africa is small, this palm being scattered among other plants, in Malaya it suffers considerably more from insect attack under plantation conditions.

Although at present it appears that the insects attacking both palms have a preference for coconut, their adaptation and that of other local insects to the oil-palm must be regarded as a possible source of danger.

DUPONT (P. R.). **Insect Notes.**—*Seychelles Ann. Rept. Dept. Agric. 1924*, p. 5. Victoria, 1925.

The Lymexylonid beetle, *Melitomma insulare*, continues to be the most destructive pest of coconuts [*R.A.E.*, A, ix, 275]. The Coccids, *Pinnaspis buxi*, *Chrysomphalus aonidum* (*Aspidiotus ficus*), and *A. ansei*, are still a source of injury to coconut plantations, and *Coccus* (*Lecanium*) *viridis* to *Citrus* and coffee bushes [*R.A.E.*, A, xiii, 113]. A species of *Fusarium* was identified as helping *Cephalosporium* in keeping a check on *Saissetia* (*Lecanium*) *nigra*. This scale on Para rubber [*Hevea*] is infested by another fungus, *Hypocrella* sp. The diminution of the ant, *Technomyrmex albipes*, is thought to be due to the reduction of scale-insect excretions on which it feeds.

The Plant Pests Ordinance, 1925. 8 pp. [*Govt. Gaz.*] no. 26. Victoria, Mahé, Seychelles, 27th June 1925.

Under this Ordinance the conditions of importation of plants into the Seychelles and of their disinfection are detailed, with the powers of the Governor in connection with the introduction and spread of insect pests and their treatment. The existence of pests on any land must be notified, and compensation is paid for plants destroyed under the Ordinance. Declared insect pests scheduled are *Oryctes rhinoceros* and *Melitomma insulare*. A list is given of past ordinances, etc., repealed by the present one.

STEPHENS (H. B.). **Experimental Timber Preservation in South Africa.**—*S. A. Jl. Industries*, October-November 1924; also *Union S. Africa Forest Dept.*, Bull. 11, 16 pp., 18 pls. Pretoria, 1924. [Received 9th October 1925.]

The object of this paper is to describe the experimental timber preservation work that is being carried out by the Forest Department of the Union of South Africa. This work includes special experiments to prevent attack by boring beetles and termites. The preservatives tried included sodium arsenite and zinc chloride; the results are so far very satisfactory, but further tests are necessary [*cf. R.A.E.*, A, xiii, 283].

CUTLER (J. V.), THERON (J. J.) & OOSTHUIZEN (J. du P.). **Some further Remarks on Tobacco Cultivation for Nicotine.**—*Union S. Africa Dept. Agric.*, Bull. no. 2 of 1925, 23 pp., 12 tables. Pretoria, 1925.

An account is given of investigations on the cultivation of *Nicotiana rustica* as a commercial source of nicotine for dips and sprays. The following is taken from the authors' summary:—The plants used were derived from different areas in the Transvaal and the Cape Province, and the results, so far as they go, should thus give a fair idea of the situation. The nicotine-content of the crop will increase chiefly with the percentage

of leaf present and the frequency of topping. The judicious use of fertilisers will also be an important factor in many localities. On the whole a nicotine-content of 4 per cent. may be taken as a fair average for plants grown under normal conditions of rainfall, soil, cultivation, etc.

HARGREAVES (H.). **Annual Report of the Government Entomologist.**—*Uganda: Ann. Rept. Dept. Agric. 1924,* pp. 21–28. Entebbe, 1925.

A list is given of pests observed on coffee in 1924, with notes on the more important ones. The Tachinid parasite of *Antestia lineaticollis*, Stål, previously mentioned [*R.A.E.*, A, xii, 469] has now been identified as *Epineura rubens*, Vill. The Capsid, *Lycidocoris mimeticus*, R. & P., seems unlikely to become a serious pest, as it only occurs on coffee that is excessively shaded. *Pseudococcus citri*, Risso, on the roots was successfully treated with varying amounts of paradichlorobenzene (1½–4 oz.), most of the bushes being in good condition 5 months after the application; above ground a kerosene emulsion spray was only temporarily effective. An ant, probably *Acropyga gowdeyi*, Wheeler, seems responsible for reinfestation by *P. citri*, stripping the outer bark of the stem bases below soil level, and producing areas where the first attack by the mealybug occurs. An unidentified Lycaenid caterpillar was observed destroying the mealybugs on one estate, and it is intended to introduce it into other places. *Leucoptera coffeella*, Guér., caused an unusually severe outbreak in June, but was controlled by parasites, probably the same as those previously recorded [*R.A.E.*, A, xi, 549]; *Cephonodes hylas*, L., was recorded for the first time on coffee in April, but does not seem a serious pest. *Toxoptera aurantii*, Boy. (*coffeae*, Nietn.) seldom causes extensive damage, being controlled by Hymenopterous parasites; and *Coccus viridis*, Green, is only a serious pest on young bushes. *Virachola dariaves*, Hew., and *Brachyacma palpigera*, Wlsm., infested the berries. *Bixadus sierricola*, White [*R.A.E.*, A, xii, 321] was a serious pest locally. Usually only two larvae are found in a stem, but as many as seven have been found in badly infested bushes.

Cotton pests included the cotton aphis [*Aphis gossypii*, Glov.], the predator previously mentioned [*R.A.E.*, A, xii, 470] having now been identified as the Syrphid, *Paragus borbonicus*, Macq.; *Zonocerus variegatus*, L.; and *Arctornis producta*, Wlk., of which the outbreaks have been more extensive.

The Scolytids, *Xyleborus affinis*, Eichh., *X. confusus*, Eichh., *X. perforans*, Woll., and *Scolytoplatypus* sp. infested rubber (*Hevea*).

Miscellaneous pests included *Mesoplatys ochroptera* and the bug, *Libyaspis* sp., feeding on *Sesbania* sp., the latter being controlled by a Coccinellid, *Caria schoutedeni*, Sic., the adults and larvae of which prey on the eggs and nymphs; *Crossotarsus* sp. on *Albizzia moluccana*; *Deilephila nerii*, L., on *Cinchona*; *Taphronota* (?) *ferrugineus*, F., causing defoliation of *Citrus*; *Cylas formicarius*, F., of which there was an unusually severe infestation in sweet potatoes; *Cosmopolites sordidus*, Germ., infesting banana; and *Megalognatha rufiventris*, Baly, attacking dahlia and maize flowers.

Much damage to clothing and fabrics in a store was caused by the cockroaches, *Blattella* (*Phyllodromia*) *germanica*, L., *Periplaneta americana*, L., and *Rhyparobia maderae*, F. Sodium fluoride was used for

controlling them. The Cucujid, *Silvanus surinamensis*, L., was recorded for the first time as a pest of stored maize.

The weevil, *Rhynchaenus stigma*, L., was intercepted in leguminous seeds from Costa Rica.

ANDERSON (T. J.). **Annual Report of the Entomologist for the Year 1924.**—*Kenya: Ann. Rept. Dept. Agric. 1924*, pp. 96–102. Nairobi [1925].

Several outbreaks of *Antestia lineaticollis*, Stål, have been reported, but less damage is done where coffee is properly shaded. *Pseudococcus citri*, Risso, continues to be the most important pest of coffee [*R.A.E.*, A, xiii, 523], the wind being largely responsible for the spread of this mealybug. It is an omnivorous feeder, and there are continuous overlapping generations throughout the year. Arrangements are being made for the introduction of the Sicilian mealybug parasite, *Tanaomastix abnormis*, Gir., which oviposits in the young mealybugs, the larvae feeding on the body of the scale and pupating under the skin. The adults begin to lay eggs immediately on hatching, and are not deterred by ants, which even if they do not spread the scale, interfere with the beneficial work of Coccinellid larvae.

Coccids on coffee additional to those previously mentioned [*R.A.E.*, A, xiii, 76] are *Pseudococcus virgatus*, Ckll., *P. maritimus*, Ehrh., and *Icerya nigroareolata*, Newst. The following leaf-eating insects are recorded: *Metadrepana andersoni*, Tams; *Parasa vivida*, Wlk.; *Zonocerus variegatus*, L., and *Z. elegans*, Thnb., the nymphs of which defoliated a considerable portion of two nurseries; *Gonocephalum simplex*, F.; *Systates* spp.; and the larvae of a Sphingid.

Two outbreaks of *Diarthrothrips coffeae*, Will., were reported, but were checked by thorough spraying with a weak lime-sulphur solution. Painting the coffee stems with a weather-proof whitewash against cutworms proved more efficacious than collars. The most durable paint is composed of 62 lb. quicklime slaked in 12 gals. hot water, to which is added 2 gals. boiling water in which 2 lb. common salt and 1 lb. zinc sulphate have been dissolved, and subsequently 2 gals. skimmed milk (or 2 lb. flour paste dissolved in 2 gals. hot water), mixing thoroughly throughout.

Pests recorded on cotton were *Aphis gossypii*, Glov., and *Dysdercus* spp.

POMEROY (A. W. J.). **The irritating Hairs of the Wild Silk Moths of Nigeria.**—*Bull. Imp. Inst.*, xix, no. 3, pp. 311–318, 2 pls., 13 figs. London, 1921.

The hairs of the larvae of the wild silk moths, *Anaphe infracta*, *A. venata* and *A. ambrizia*, do not urticate and are a negligible source of irritation. The difficulty caused by the irritant hairs of the adults coming in contact with the outside envelope in which the cocoons are found, and which is the most valuable part of the nest, may be readily overcome by removing the mass of cocoons before the moths emerge. By adopting this method the propagation of the species is increased, since when left in the envelope a certain percentage of the adults fail to emerge, owing to the close proximity of the individual cocoons; the silk is uniformly graded at the same time by this measure.

Brooks (A. J.). **Work connected with Insect and Fungus Pests and their Control.**—*Gambia: Ann. Rept. Dept. Agric. 1924*, pp. 13–18. London, 1925.

Aphis sorghi, Theo., causes considerable damage every year to guinea corn (*Sorghum*). The Aphid is attacked by the Syrphids, *Paragus borbonicus*, Macq., and *Xanthogramma pfeifferi*, Big. The roots should be dug out and burned as soon as the crop is harvested. Though the Coccids, *Pinnaspis minor*, Mask., *Parlatoria zizyphus*, Lucas, *Lepidosaphes beckii*, Newm., *Coccus hesperidum*, L., and *Pseudaonidia trilobitiformis*, Green, occur on *Citrus*, they do not cause any serious damage, as their numbers are kept down by the ant, *Oecophylla smaragdina*, F. Miscellaneous pests recorded are the grasshopper, *Zonocerus variegatus*, L., attacking the foliage of various cereals; and the flea-beetles, *Nisotra dilecta*, Dalm., and *N. uniformis*, Jac., causing considerable injury in nursery beds of *Hibiscus*.

Considerable damage to general merchandise is done by silver fish [*Lepisma*], against which it is advisable to fumigate with nicotine twice a week for the first month, followed by weekly fumigations as long as is necessary. It is essential that all infested buildings should be treated at the same time.

Vayssière (P.) & Mimeur (J.). **Les Myriapodes et les Hémiptères nuisibles au Cotonnier en Afrique Occidentale Française.**—*Agron. colon.*, no. 91, pp. 20–44, 8 pls. Paris, July 1925.

Myriapods injurious to cotton in French West Africa include *Ophistreptus contortus*, Brol., which attacks the roots of the young plants, though it is not a common pest; *Peridontopyge spinosissima*, Silv., very common in the French Sudan during the rainy season, as much as 15 per cent. of the germinated seeds having been destroyed by it in 1922–23; and *Syndesmogenus mimeuri*, Brol., which only occurs in the Nigerian Sudan, attacking the young seedlings. The measures recommended against these Myriapods are to soak the seed for an hour before planting in a toxic solution, such as 40 per cent. formol or corrosive sublimate 1 : 1,000, and to finish sowing before the rainy season begins.

The adults of *Nezara viridula*, L., in the Sudan attack cotton particularly towards the end of the season, when *Sorghum* has all been harvested and various other graminaceous plants are drying up; it presumably never deposits eggs on cotton under normal conditions. It attacks the green capsules. No parasites have been found in the Sudan. The collection of the insects, destruction of wild grasses near the cotton field, and the use of *Sorghum* as a trap crop are suggested as remedial measures. Another Pentatomid, *Hotea subfasciata*, Westw., is only an occasional pest of cotton; it generally occurs on forest trees, particularly *Ficus*. *Anoplocnemis curvipes*, F., is a polyphagous Coreid that attacks the green tips of the twigs of cotton plants in the Sudan. No parasites or predators of this species are known in Senegal. The collection of the adults and the use of *Helianthus* as a trap crop have been recommended for its control. *Oxycarenus hyalinipennis*, Costa, occurs throughout the year on permanent cotton plants, and passes to the annual plants before the opening of the capsules. The preferred food is the oil in the seed. Remedial measures are mainly the destruction of old infested plants, the use of *Hibiscus* as a trap

crop, and hand collection. Native cottons are little affected by *Dysdercus superstitiosus*, F., which mainly attacks imported ones. The remedial measures recommended by various authors are quoted [*R.A.E.*, A, x, 283]. The Jassid, *Empoasca* (*Chlorita*) *facialis*, Jac., occurs in all stages on the lower surface of the leaves. Sprays of soap or nicotine and soap solutions or dusting with 2 parts pyrethrum to 1 part flowers of sulphur are recommended. *Pseudococcus filamentosus*, Ckll., is responsible for the destruction of a large proportion of the cotton crop in certain years. In the Sudan it is attacked by *Scymnus* (*Nephus*) *ornatus*, Sic. Its food-plants, particularly *Loranthus*, should be destroyed as far as possible, and insecticides such as 6 to 15 per cent. kerosene emulsion, or mixtures of kerosene, soap and lime should be used.

Four other apparently new Jassids have been found on cotton, but their economic importance has not yet been ascertained.

VUILLET (J.). **Degré de sensibilité des différents Caféiers au** *Stephanoderes coffeae*.—*Rev. Bot. appl. & Agric. colon.*, v, Bull. no. 48, pp. 601–604. Paris, 31st August 1925.

Most of the measures suggested for the control of *Stephanoderes hampei* (*coffeae*) have the disadvantage of not being readily applicable on areas, such as many in the African colonies, that are cultivated entirely by natives. It is, therefore, a matter of great importance to determine which varieties of coffee show the greatest resistance to the attacks of this pest. The findings of other workers in this respect are discussed. From his own observations the author cannot trace any constant preference for any particular variety.

GOOSSENS (V.). **Note sur le** *Limonia poggei* **Engl. var.** *latialata* **De Wild., employé pour la greffe de l'oranger au Jardin botanique d'Eala.**—*Bull. agric. Congo belge*, xv, no. 1, pp. 157–162, 4 figs. Brussels, March 1924.

In certain districts of the Belgian Congo orange trees have been seriously attacked by the larvae of a Longicorn of the genus *Monochamus* (*Monohammus*), which cause a considerable diminution in the crop and finally kill the trees. This beetle has been studied by R. Mayné, from whose report to the Government the following facts concerning it are taken :—

The eggs are laid on the trunk of the tree, at its base, and seem usually to be placed in a wound. The young larvae make flat, winding galleries in the cambium, generally within 2½ feet of the ground. The first indications of their presence are the loss of leaves by some of the branches, and the appearance of patches of dead bark near the base of the trunk. It is during this phase of the life-history, which is of long duration, that the greatest damage is done. Subsequently the larva bores deeper into the wood, making irregular galleries, which are usually blocked with frass ; finally it makes an oval chamber in the sound wood, close under the bark, where it pupates.

Good cultivation (manuring, hoeing, pruning) is of value in preventing attack ; wounds in the tree are a source of danger, and if made should be immediately covered with tar. In districts where the pest occurs, the bases of the trunks of all *Citrus* trees should be tarred to prevent

oviposition. When the pest is already present, the patches of dead bark at the base of the trunk should be removed with a knife, in order to uncover the larval galleries, leaving a clean wound that can be dressed with tar. When the larvae have entered the heart-wood, an attempt may be made to reach them with pieces of wire ; or wads of cotton-wool soaked in benzine, carbon bisulphide or chloroform may be placed in the holes, which should then be blocked with clay. These methods are, however, rendered difficult by the presence of frass and the irregular nature of the galleries. Dead trees should be cut down and burnt with as little delay as possible.

It has since been found, however, that the above measures, although of considerable value, are, in the majority of cases, impracticable, and the cultivation of *Citrus* has been abandoned in some places.

The author has, therefore, made experiments in the grafting of *Citrus* on stocks of an indigenous tree, *Limonia poggei* var. *latialata*, which have given most promising results. This tree has so far proved absolutely immune from the attacks of *Monochamus*. The orange, mandarin [*Citrus nobilis*], pomelo [*C. decumana*] and lemon can all be easily grafted on to this stock, and appear to thrive even better on it than on the usual one.

DUMONT (C.). **Note sur un Phycide (Lep.) nuisible aux cultures de Ricin.**—*Bull. Soc. ent. France*, 1925, no. 14, pp. 232–236. Paris, 1925.

The larva of *Phycita diaphana*, Stgr., f. *ricinivorella*, n., is recorded from castor-oil plants (*Ricinus communis*) in Algeria, the greater part of a plantation being seriously infested. The infestation was observed from October to April ; if it should be prolonged further the plantation might be damaged to a disastrous extent. A carefully planned system of irrigation should play an important part in the protection of this crop, well watered plants being better able to make good the defoliation caused by the caterpillars. Owing to the increased cultivation of *Ricinus* on account of the value of castor oil as a lubricant for aviation purposes, this pest may become of some importance.

BALLOU (H. A.). **Insect Pests and Cotton Development.**—*Empire Cotton Growing Rev.*, ii, no. 4, pp. 323–329. London, October 1925.

This is a review of the insect pests affecting the cotton crop throughout the world, and more particularly of the experience gained in the West Indies in the establishment of the cotton industry during the last twenty years.

PARNELL (F. R.). **The Breeding of Jassid-resistant Cottons. Report for the Season 1924-25.**—*Empire Cotton Growing Rev.*, ii, no. 4, pp. 330–336. London, October 1925.

The information contained in this paper on varieties of cotton resistant to *Empoasca* (*Chlorita*) *facialis* in South Africa has already been noticed from another source [*R.A.E.*, A, xiii, 527].

BALLARD (E.). **Fourth Entomological Progress Report (Australia).**—*Empire Cotton Growing Rev.*, ii, no. 4, pp. 341–347. London, October 1925.

In relation to the spread of internal boll rots so prevalent in the coastal cotton in Queensland the Pentatomid, *Tectocoris lineola* (*banksi*) seems to be rather more important than *Dysdercus sidae* [*cf. R.A.E.*, A, xiii, 520]. It is fortunately a slow breeder and easily controlled by hand picking. Apart from damage to the developing bolls and seeds, *Tectocoris*, *Dysdercus*, and the small cotton stainer, *Oxycarenus*, all damage the seed in the open boll. A test was made of the value of a trap-crop of maize to attract *Heliothis* (*Chloridea*) *obsoleta*, which reaches its maximum intensity about December. Widespread field observations showed that maize is more attractive to it than cotton from its earliest stages. The eggs are laid on maize as long as it is green, and there are no definite broods, oviposition occurring continuously from October or November to February or March [see next paper]. *Dichocrocis punctiferalis* is equally attracted by maize, but seems to prefer it in a later stage. *Crocidosema* (*Eucosma*) *plebeiana* was a serious factor after Christmas in only one part of the cotton belt, on an area of red scrub soil markedly deficient in potash and phosphate. Ratoon and standover cotton coming into the ginneries from the central districts was badly infested with *Platyedra gossypiella*, but this moth has not spread to any new area, and the twenty-sixth parallel remains its southern boundary. A Coreid bug, *Homoeocerus* sp., which appeared early in the season, pierced the squares, flower buds, and young bolls, causing them to be shed. The young bolls showed symptoms of bacterial infection similar to those noticed in India [*R.A.E.*, A, xi, 216]. This bug, which resembles *Dysdercus* in general appearance, lays its eggs on the leaves. The eggs are heavily parasitised, and the bugs consequently become very scarce after December.

BALLARD (E.). **The Maize Grub Pest. A Suggestion for Cotton Farmers.**—*Queensland Agric. Jl.*, xxiv, pt. 2, pp. 146–147. Brisbane, 1st August 1925.

Trap-crops of maize are a valuable means of protecting a cotton crop from *Heliothis obsoleta*, F., provided that they are judiciously applied. On a basis of 15 rows of cotton to the acre, 2 rows of maize should be planted at the same time as the cotton. This method may be modified for individual farms, but the essential point is that the maize must not be allowed to stand until the silk has dried up, or the mature larvae will then attack the cotton. After the maize is cut, the ground is scarified to destroy the pupae in the soil.

BALLARD (E.). **Damage done to Cotton Seed by Plant Bugs.**—*Queensland Agric. Jl.*, xxiv, pt. 2, pp. 203–206, 3 pls. Brisbane, 1st August 1925.

Tectocoris lineola, F., *Dysdercus sidae*, Montr., and *Oxycarenus luctuosus*, Montr., all feed on the seeds in open cotton bolls. The appearance of the attacked seed is described and illustrated. Of the 1923–24 crop 30 per cent. of the seed was damaged by sucking insects.

JARVIS (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiv, pt. 2, pp. 100–102, 5 figs. Brisbane, 1st August 1925.

Though large numbers of larvae of a Stratiomyiid fly, *Metoponia rubriceps*, Macq., have been found attached to the roots of sugar-cane stools, they probably do not cause any appreciable damage. Soil fumigants, such as paradichlorobenzene or carbon bisulphide, could be applied for their control, and dehydrated tar would probably act as a repellent. The latter should be mixed at the rate of 42 lb. with 56 lb. coarse sawdust and sown like manure in a drill alongside the rows to a depth of about 4½ inches and then covered. The deterrent odour will probably protect the sets and main roots for some weeks, thus allowing the plants to become strong enough to resist any subsequent invasion. Laboratory experiments with dehydrated tar as a repellent for *Lepidoderma albohirtum*, Waterh., are sufficiently conclusive to warrant field experiments.

WENHOLZ (H.). **The Storage of Maize. Silos on the Atherton Tableland, Queensland.**—*Agric. Gaz. N.S.W.*, xxxvi, pt. 8, pp. 533–543, 2 figs. Sydney, 1st August 1925.

In Queensland in the district under review the maize crop may become infested by adult weevils in the field before harvest, and though little damage is done during the winter, the egg and larval stages present develop when the weather becomes more favourable. Where tank storage is used, no treatment for weevils is required, provided that the tanks are filled completely and rammed so as to exclude all possible air and then sealed. In silos, where fresh air is constantly being admitted as the maize is being taken from or added to the bins, other measures are necessary. With the maize 70 feet high in the bin, successful fumigation was obtained by pouring 2½ gals. carbon bisulphide on the top of the grain and then sealing the bin top and bottom. The present practice is to use about 1 to 1½ gals. per bin, supplemented by a cupful or so when the maize is moved and fresh air admitted, or by proportionate amounts when any grain is added to the bin. This method controls the weevil at a cost of about 1d. per 30 bushels. Carbon dioxide may prove better if it can be used as cheaply [*cf. R.A.E.*, A, ix, 521].

[**Prickly-pear Control.**]—*Queensland Prickly-pear Land Commiss. 1st Ann. Rept. 1924–25*, pp. 19–28. Brisbane, 1925.

The work of the Prickly-pear Land Commission with regard to the biological control of prickly-pear (*Opuntia* spp.) in Queensland is discussed. Two species of cochineal insect, *Dactylopius* (*Coccus*) *indicus* and *D. tomentosus*, have both given good results in this respect; and the Commission has decided during the coming year to distribute cochineal insects in large numbers throughout the prickly-pear districts. These insects have been at work in some districts during the last four years, and are apparently the most valuable of all those that attack prickly-pear.

In general it is found that cochineal insects are of little or no value in dealing with light infestations, and this still remains the field for chemical action. Moreover, the prospect of their ultimately eradicating prickly-pear on a large scale is not encouraging. As, however, they

attack and destroy all young plants, in localities where they have become well-established they will probably restrict the density of prickly-pear growth and perhaps keep the land sufficiently open for cattle pasturage. In badly infested localities the density of growth will be broken down and prolific fruiting restricted, perhaps enabling other means of dealing with the pear to be successfully undertaken.

Emphasis is laid on the fact that biological control alone will not solve the problem. Poisoning, clearing and other mechanical methods must also be made use of, and instances are quoted where areas free from this pest have thus been maintained in the midst of badly infested ones.

Regulation No. 1 of 1925. 2 pp. Typescript.—*West Pacific High Commr. Gaz.*, New Hebrides, 31st July 1925.

To prevent the introduction into the New Hebrides of the coffee berry borer, *Stephanoderes hampei* (*coffeae*), the importation is prohibited from Brazil, Dutch East Indies, British West Indies, French Equatorial Africa and from countries where such importation is not prohibited, nor subject to proper control, of coffee beans (except those prepared for consumption), coffee seeds, plants and cuttings, all packages, packing and composts used in transport, and all seeds, plants and cuttings, particularly *Hibiscus* and *Rubus*, liable to carry the beetle. The importation of all these from other countries may be allowed subject to a certificate of freedom from possibility of infestation by *S. hampei*.

Tothill (J. D.). *Levuana iridescens* **Campaign.**—*Legis. Council, Fiji*, Paper no. 20, 1 p. [Suva] 12th June 1925.

This report covers the period from 1st November 1924 to 1st June 1925. During 1922, the coconut leaf moth, *Levuana iridescens*, spread to Leleuvia and Moturiki and during 1923 to Ovalau and Naigani. As a result of this invasion the annual copra yield of these islands, valued at £10,000, was wiped out. The Government therefore decided to take active steps to control this moth and prevent its further spread, and a sum of £5,000 was voted towards the campaign. So far the original home of *L. iridescens* has not been found, so that its principal natural enemies cannot be studied or imported. An attempt is being made to introduce a strong colony of *Chelonus blackburni* from Hawaii, and Australian insectivorous birds are also being introduced.

Spraying experiments with lead arsenate or calcium arsenate and sea water have given excellent results; 1½ lb. lead arsenate with 40 gals. sea water killed all the larvae in 5 to 10 days without foliage injury. The poison adhered to the leaves for at least two months.

Tothill (J. D.). **An Interim Report on the** *Levuana* **Campaign.**—MS. 3 pp. f'cap., 7th August 1925, received from Colonial Office 5th October 1925.

The previous difficulties of spraying coconut palms in Fiji against *Levuana iridescens*, resulting from the lack of roads and fresh water, have been overcome by the use of sea water and by mounting one of the so-called high powered solid stream machines on a barge and operating from the waterways through a hose line of half-a-mile or less in length.

The important Tachinid parasite, *Ptychomyia remota*, and a Clerid, *Callimerus* sp., both attacking *Artona* (*Brachartona*) [*catoxantha*] in the Federated Malay States, have been introduced and are feeding freely on *Levuana* in Fiji. There is great difficulty in transporting parasites that do not hibernate, and therefore cannot be handled in cold storage, the journey from the Federated Malay States to Fiji occupying 25 days. *Degeeria albiceps* and *Apanteles* sp. are to be collected from Java. The surest and possibly the cheapest method of transporting the insects would be by seaplane from Surabaya to Cairns.

SWEZEY (O. H.). **Maui Insect Notes and Records.**—*Proc. Hawaiian Ent. Soc. 1924*, vi, no. 1, pp. 47–48. Honolulu, August 1925.

On a recent inspection trip to the sugar plantations of Maui the following recently-introduced beneficial insects were found to be established: *Scolia manilae*, Ashm., *Casinaria infesta*, Cress., *Notogonidea luzonensis*, Rohwer, *Hyperaspis silvestrii*, Weise, and *Cyrtorhinus mundulus*, Bredd. Other insects recorded include the ant, *Monomorium fossulatum seychellense*, Emery, found at the base of pineapple plants and in the soil among roots of sugar-cane; and *Protoparce quinquemaculata blackburni*, Butl., the larvae of which occurred on *Nicotiana glauca*.

SWEZEY (O. H.). **The Tomato Hawk-moth in Hawaii.**—*Proc. Hawaiian Ent. Soc. 1924*, vi, no. 1, pp. 49–50. Honolulu, August 1925.

Protoparce quinquemaculata blackburni, Butl., is recorded from Hawaii as feeding on weeds, *Solanum* spp., *Nicotiana glauca*, and tomatos, both plants and green fruit; it is, however, of rare occurrence.

SWEZEY (O. H.). **The Insect Fauna of Trees and Plants as an Index of their Endemicity and Relative Antiquity in the Hawaiian Islands.**—*Proc. Hawaiian Ent. Soc. 1924*, vi, no. 1, pp. 195–209. Honolulu, August 1925.

Numerous indigenous and established trees of the Hawaiian Islands are discussed, their respective insect faunas being given as an indication of their relative antiquity in these islands. It is apparent that those trees that are attacked by the greatest number of species of insects, or that have the greatest number that are especially attached to them, must be those that have been in existence on the Islands for the greatest length of time, and have thus given the insects greater opportunity to become specialised and to develop the particular species that are now found associated with them.

SCOTT (H.). **Note on the Occurrence of *Lyctus villosus* Lesne in the Hawaiian Islands (Coleoptera, Lyctidae).**—*Proc. Hawaiian Ent. Soc. 1924*, vi, no. 1, pp. 213–214. Honolulu, August 1925.

A Lyctid obtained in Honolulu in 1900 has now been identified as *Lyctus villosus*, Lesne, originally described from Mexico. It was bred from a piece of the wood of *Leucaena esculenta*.

DE AZEVEDO (A.). **Insecto da fructa de conde.** [The Insect of Soursop.] —*Correio-agric*, i, no. 3, pp. 59–60, 3 figs. Bahia, March 1923. [Received 28th September 1925.]

The caterpillar of the Xyloryctid, *Stenoma anonella*, Sepp, is a serious pest of soursop [*Anona muricata*] in Brazil [*cf. R.A.E.*, A, ix, 398]. The eggs are laid in the fruits, in which the larvae live. The collection and destruction of infested fruits, the protection of fruits by means of gauze bags, and the capture of the adults in light traps are the measures advised. A Curculionid, *Heilipus lactarius*, Germ., mines the trunk. Removal is the only remedy.

DE AZEVEDO (A.). **As cochonilhas das laranjeiras.** [The Coccids of Orange Trees.]—*Correio-agric.*, i, no. 4, pp. 86–90, 1 fig. Bahia, April 1923. [Received 28th September 1925.]

This is a popular article on the Coccids infesting orange trees and of the measures to be taken against them.

BONDAR (G.). **Os coqueiraes no littoral da Bahia.** [The Coconut Plantations on the Coast of Bahia.]—*Correio-agric.*, iii, no. 8, pp. 203–210, 5 figs. Bahia, August 1925.

The insect pests of coconut include the Chrysomelids, *Delocrania cossyphoides*, Guér., and *Mecistomela corallina*, Vigors, and the Curculionids, *Rhina barbirostris*, F., and *Homalonotus coriaceus*, Gyll. Spraying with a 2 per cent. solution of Paris green is effective against the two former. *H. coriaceus* is more difficult to deal with, as the adult remains by day in the leaf axils and the larva occurs in the bases of the floral peduncles, but an abundant spray of Paris green killed some adults and larvae. This effect was not noticed until some 10 days after treatment, rain having apparently washed the poison in. There is no economical remedy against *R. barbirostris*.

BONDAR (G.). **Moscas das fructas na Bahia.** [Fruit-flies in Bahia.]—*Correio-agric.*, iii, no. 8, p. 226. Bahia, August 1925.

The fruit-flies injurious in Bahia are *Anastrepha fraterculus*, on guavas, oranges, tangerines [*Citrus nobilis*], mangos, etc.; *A. serpentina* on various Sapotaceae; and *Lonchaea aenea*, usually associated with these two species, but not very common. All three are indigenous to Brazil.

A. T. **O Caruncho das Tulhas e a Broca do Café.** [*Araecerus fasciculatus* and *Stephanoderes hampei*.]—*Rev. Soc. rur. brasileira*, v, no. 62, pp. 297–298, 2 figs. S. Paulo, August 1925.

This article describes the differences in the life-history of, and damage by, the Anthribid, *Araecerus fasciculatus*, DeG., and the Scolytid, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.). The former attacks stored coffee in Brazil and is of very slight importance compared with the latter.

Decree modifying Decree of 14th April 1925.—1 p. Typescript. Buenos Aires, 20th July 1925.

By this modification of a previous decree [*R.A.E.*, A, xiii, 491] fresh chestnuts are included in the list of fruits permitted importation into Argentina from the countries mentioned. The prohibition of the importation of oranges from the zone of Rio de Janeiro, and apples from New Zealand is postponed until 31st December 1925.

Emerson (A. E.). **The Termites of Kartabo, Bartica District, British Guiana.**—*Zoologica*, vi, no. 4, pp. 291–459, 71 figs., 2 pls. New York, 29th July 1925.

The material upon which this report is based was largely collected by the author during three successive trips to British Guiana. It includes 78 species, of which 51 are new, with a key to all known termites from British Guiana.

Fruit Cultivation in Trinidad and Tobago.—*Agric. Soc. Trinidad*, xii+91 pp., 17 figs. Port-of-Spain, 1923. [Received 23rd September 1925.]

Under the individual fruits notes are given by F. W. Urich on the insect pests and their control, and a section is devoted to the methods of preparing various insecticides.

Wehrle (L. P.). **The Clover-seed Caterpillar.**—*Cornell Univ. Agric. Expt. Sta.*, Bull. 428, 34 pp., 13 figs. Ithaca, N.Y., June 1924. [Received 23rd September 1925.]

The results of field and laboratory studies on the clover-seed caterpillar, *Cydia* (*Laspeyresia*) *interstinctana*, Clem., conducted at Ithaca, N.Y., from 1920 to 1923 are discussed. The distribution of *C. interstinctana*, which is a native of North America, and its food-plants [*R.A.E.*, A, vii, 145] are reviewed. Definite conclusions regarding the full extent of injury to the plant or to the seed are difficult to arrive at, as this moth is closely associated with other injurious insects. In addition to the reduction of the seed crop, injury is caused by the caterpillars feeding under the leaf-sheaths and on the young unopened leaflets at the crown of the plant. Descriptions of the various stages are quoted from other authors. Two generations occur in the vicinity of Ithaca, and there is reason to believe that in favourable seasons a partial third one may be present. The flight of the moths of the first generation extends from late May or early June until late June or early July and that of the second from late July or early August to about the beginning of September. The egg stage lasts about 9 days; the larval stage about 30 in the first generation and about 278 in the second; and the pupal stage about 13 in the first generation and 19 in the second. The overwintering cocoon is found under the leaf-sheaths at the crowns of clover plants, and on the ground under them. The winter is usually passed as a larva in this cocoon, though there is reason to believe that some of the larvae may pupate in the autumn.

Two Hymenopterous parasites, *Phaneroloma tibialis*, Hald., and *Bassus laticinctus*, Cress., were reared from this moth.

No definite experiments have been conducted, so far as is known, for the purpose of determining the value of any control methods.

The cutting of the first crop of clover early in June is apparently the best method of reducing the numbers of the insects. As, however, the caterpillars feed in the crowns as well as in the heads, it is likely that a considerable number escape destruction by such early cutting. Ploughing under the clover and planting the field with some other crop at the end of two years would doubtless be of service.

A bibliography of 79 references is appended.

TRIMBLE (F. M.). **Scale Insects injurious in Pennsylvania.**—*Pennsylvania Dept. Agric.*, Gen. Bull. 398, 21 pp., 2 pls. Harrisburg, Pa., February 1925. [Received 12th September 1925.]

Of the 110 species of scale-insects recorded from Pennsylvania only 24 are considered generally injurious. They are briefly described, with recommendations for their control, which include fumigation with sodium and calcium cyanide and spraying with contact insecticides. Formulae for these are appended, with instructions for their preparation. A key to the scales is given, arranged under the plants attacked.

ELMER (O. H.). **Transmissibility and Pathological Effects of the Mosaic Disease.**—*Iowa Agric. Expt. Sta.*, Res. Bull. 82, pp. 39–91, 2 figs. Ames, Iowa, February 1925. [Received 18th September 1925.]

The investigations discussed deal chiefly with the question of the transmissibility of mosaic disease, both artificially and by means of insect vectors. Certain cross inoculations of the disease could only be secured by the use of the latter. The technique employed is described in detail.

The following is taken from the author's summary: The mosaic virus is transmissible among plants belonging to different families and orders, 15 inter-family and 11 inter-order transmissions being obtained. Ten new plants subject to the disease were found, the virus from which could be transmitted to the same species, to tobacco, or to tomato. Mosaic virus transmitted from sugar-cane, bean, celery and other plants to tobacco and tomato produced mosaic symptoms similar to those occurring on tobacco or tomato infected with the virus from tobacco. The masking of mosaic symptoms is not co-ordinate with attenuation of virulence of the mosaic virus. *Pseudococcus maritimus*, Ehr., and *Protoparce sexta*, Johan. (tobacco horn-worm) appear to serve as transmitters of the disease. Insect vectors served as transmitters among plants belonging to different families and orders. Cross infections were effected by Aphids from potato and cucumber to cowpea (*Vigna sinensis*) and from celery to cucumber. *Pseudococcus maritimus* transmitted the disease from crookneck squash (*Cucurbita pepo* var. *condensa*) to tomato, tobacco and cowpeas, as well as from egg-plants (*Solanum melongena*) to cowpeas.

A list of 64 references to the literature is given.

WEISS (H. B.). **Results of the Fifth Year's Work against the Gipsy Moth in New Jersey.**—*New Jersey Dept. Agric.*, Circ. 89, 19 pp., 7 maps, 5 figs. Trenton, N.J., July 1925.

The work accomplished during 1924–25 in New Jersey against the gipsy moth [*Porthetria dispar*, L.] is recorded, and the progress of the eradication measures is described.

COBB (N. A.), STEINER (G.) & CHRISTIE (J. R.). **The Nemic Parasites of Grasshoppers.**—*Official Record U.S. Dept. Agric.*, iv, no. 35, p. 5. Washington, D.C., 2nd September 1925.

The ravages of grasshoppers are greatly reduced in Virginia and Massachusetts by the Mermithids, *Agamermis decaudata* [*R.A.E.*, A, xi, 361] and *Mermis nigrescens* or a closely allied species. The eggs of the latter are deposited mainly on the buds and young blades of forage plants such as ribgrass (*Plantago lanceolata*). They are thus ingested with the leaf by the young grasshoppers, inside which they hatch in a few hours. The young hairworm at once makes its way through the wall of the alimentary canal into the body cavity of the grasshopper, where it develops until late summer. Attempts are being made to colonise these hairworms by transferring infested grasshoppers to areas where the grasshoppers are free from them.

WEIMER (J. L.) & HARTER (L. L.). **Varietal Resistance of Sweet Potatoes to Nematodes, *Heterodera radicicola* (Greef.) Muller, in California.**—*Phytopathology*, xv, no. 7, pp. 423–426. Lancaster, Pa., July 1925.

Among numerous varieties of seed sweet potatoes treated in mercury bichloride (1 : 1,000) for 10 minutes and then planted a few Nematode galls were found in five varieties only. It is suggested that resistant varieties should be used to supplant more susceptible ones on sandy land infested with *Heterodera radicicola*.

JACOBSEN (W. C.). **Bureau of Plant Quarantine and Pest Control.**—*Mthly. Bull. Cal. Dept. Agric.*, xiii (1924), no. 7–12, pp. 156–161. Sacramento, Cal., 1925.

The importance and scope of the work of the Bureau of Plant Quarantine and Pest Control are briefly reviewed, and reports of the various departments for 1924 are given. The Plant Quarantine service is discussed by A. C. Fleury, the most important interceptions during the year being *Ceratitis capitata*, Wied. (Mediterranean fruit-fly) and *Dacus* (*Bactrocera*) *cucurbitae*, Coq. (melon fly) from Hawaii. During the year additional border inspection stations were opened, at which cotton seed, cotton bolls and other carriers of the cotton boll weevil [*Anthonomus grandis*, Boh.] were frequently intercepted.

The work of the branch of vacuum fumigation is reported on by D. B. Mackie. During 1924 three new vacuum fumigation plants were constructed, in one of which some 1,200 tons of potatoes were treated for the control of tuber moth [*Phthorimaea operculella*, Zell.]. With the extension of carbon bisulphide fumigation *in vacuo*, the shortening of the fumigation cycle by various means, such as quick closing valves, has shown that the combination of carbon bisulphide and air may, under certain conditions, result in an explosion. However, the system of adding a neutral and non-explosive gas such as carbon dioxide, by which the explosiveness is eliminated, is now possible on a commercial scale. The application of heat in insect control has progressed satisfactorily where live steam is the medium.

URBAHNS (T. D.). **Field Entomology.**—*Mthly. Bull. Cal. Dept. Agric.*, xiii (1924), no. 7–12, pp. 161–164. Sacramento, Cal., 1925.

A list is given of the more important insect pests in 1924, with notes on their habits and control. *Eriophyes pyri* (pear-leaf blister mite) was controlled by a cluster bud spray of 1 gal. lime-sulphur to 25 gals. water. *Tetranychus telarius* (red spider) caused considerable damage to prunes, peaches, almonds, apples, pears and other orchard crops; the results of comparative tests with various sprays indicate that soluble sulphur compounds are injurious to leaves, especially of prune trees, where 2 or more applications are necessary or where spraying is delayed until the hot weather has set in; an oil emulsion of the non-burning type proved very effective. *Saissetia oleae* (black scale) has apparently been increasing in abundance on olives in the northern part of California; some of the oil emulsions tried against it gave good results, while others caused considerable scorching. *Cydia* (*Carpocapsa*) *pomonella* (codling moth) was very abundant in the southern apple districts, the losses in many cases being due to lack of thoroughness in application of the early sprays. An unusually severe outbreak of *Coleophora sacramenta* (pistol case-bearer) occurred in a cherry district; fairly satisfactory results were obtained with 4 lb. lead arsenate to 100 U.S. gals. water applied when the buds were bursting; later sprays were not satisfactory, and a late summer spray was necessary to destroy the larvae of the summer generation. *Acrobasis nebulella* (pecan case-bearer) was introduced in the dormant larval stage with pecan trees and became widely distributed throughout the State, but it is believed that its establishment has been prevented by careful handpicking of larvae and pupae from the trees throughout the summer. *Galerucella luteola* (European elm leaf beetle) was found on elm trees along the streets of Fresno; it increased rapidly and was spread by motor cars parked under the infested trees; there were apparently 4 generations in the season. Though the beetles were easily killed by lead arsenate, it was very difficult to apply owing to the height of the infested trees. *Scolytus* (*Eccoptogasier*) *rugulosus* (shot-hole borer) was very destructive to pear and apple trees, and some orchards that had not been properly irrigated and pruned during the previous season were practically destroyed. *Anthonomus grandis* (cotton boll weevil) has not yet been found in California, nor is there any indication of the presence of *Hypera variabilis* (*postica*) (alfalfa weevil) [*cf. R.A.E.*, A, xii, 449].

LEIBY (R. W.). **Insect Enemies of the Pecan in North Carolina.**—*Bull. N. Carolina Dept. Agric.*, 67 pp., 64 figs. Raleigh, N.C., February 1925. [Received 23rd September 1925.]

Much of the information contained in this bulletin has already been noticed [*R.A.E.*, A, vi, 168, 226, 228]. Additional parasites attacking the larva of *Acrobasis nebulella*, Riley, are the Eulophid, *Eurytoma* sp., the Ichneumonids, *Scambus grapholithae*, Cress., *S. picticornis*, Cress., and *Pristomerus* sp., and the Tachinid, *Exorista boarmiae*, Coq. *Tetrastichus* sp. has been reared from the pupa of *Proteopteryx bolliana*, Sling., and *Apanteles* sp. from the larva. The larva of *Acrobasis caryae*, Grote, emerges from its hibernaculum in the early spring, and about the middle of April bores into the terminal or lateral shoots of the pecan; it pupates about the middle of May, the moths emerging

about 9 days later. Oviposition occurs about 7 days after emergence. It is not known if two broods are regularly produced annually, but the young larvae of the first or second brood are partly developed on the leaves in late summer, migrating to the buds in early autumn, where they prepare their hibernacula. Two Tachinids, *Nemorilla maculosa*, Meig., and *Didyma exigua*, Wulp, were reared from pupae of *A. caryae*. There are two generations of *Datana integerrima*, G. & R., each year, the caterpillars of the first appearing usually in the latter part of June. The larval stage lasts 27–35 days, and the pupal from 12 to 16, the moths emerging in August. Eggs are deposited in masses on the underside of the leaflets and hatch in about 6 days. The second brood caterpillars appear during late August, pupate below the soil and hibernate in this condition, the moths emerging late in May, June, and early July. Parasites include the Tachinid, *Euphorocera claripennis*, Macq., attacking the larvae, and the Hymenoptera, *Trichogramma minutum*, Riley, *Telenomus sphingis*, Ashm., and *Baryscapus* sp., all reared from the eggs. *Tetralopha subcanalis*, Wlk., the larvae of which live gregariously in a web, has three generations each year; it passes the winter in the larval stage, and the adults of the first generation appear about the middle of May. Those of the second appear towards the end of July, and a third generation during September. The larvae of *Catocala viduata*, Guen., hatch in late spring from eggs deposited the previous autumn, the pupal stage lasting about 31 days. The moths have been observed from June to October. *Lithocolletis caryaefoliella*, Clem., hibernates as a larva and pupates about the middle of June, the moths emerging during the latter part of the month. *Cressonia juglandis*, S. & A., of which there are two generations a year, has a larval stage of 35 days, pupation occurring on or in the soil. The larvae are parasitised by *Pleurotropis* sp. *Psilocorsis cryptolechiella*, Chamb., has two generations a year, the larvae feeding during late June and early July and again in August; the pupal stage lasts about 13 days. An undescribed species of *Acrobasis* was observed, having at least two generations a year. The larvae of the first generation were found during late June and July, and the pupal stage lasted 10–14 days. Larvae of the second generation emerge in late August and early September, the winter probably being passed in this stage.

Phylloxera caryaecaulis, F., attacking seedling pecan trees almost exclusively, is parasitised within its gall by the larva of *Eurytoma* sp. Other Aphids on pecan include *Monellia costalis*, F., *Myzocallis fumipenellus*, Fitch, and *Hyadaphis* sp., *M. costalis* being the commonest. *Lachnosterna* (*Phyllophaga*) *quercus*, Knoch, *L. ephelida*, Say, *L. gracilis*, Burm., *L. foxi*, Davis, and *L. soror*, Davis, swarm at night on pecan foliage during July. *Conotrachelus elegans*, Say, has been recorded in orchards only in the vicinity of Raleigh.

Among the insects injuring the nuts, *Balaninus caryae*, Horn, has sometimes one annual generation and sometimes one only in two years. Whereas there are three generations a year of *Cydia* (*Laspeyresia*) *caryana*, Fitch, in the more southern States, there appear to be only two in North Carolina. The larvae start feeding in August, pass the winter in this stage, and pupate in March or April, the pupal stage lasting 15 to 19 days. Adjacent hickory trees have proved an almost constant source of infestation to pecans. There are two generations a year of *Clastoptera obtusa*, Say, eggs being deposited under the bark in the autumn and the young nymphs appearing on the pecan leaf and nu

stalks early in May. The adults of the second generation appear during August.

Insects attacking the living trunk, branches, limbs and twigs include *Cossula magnifica*, Strecker, on the pupa of which what is possibly the immature stage of *Phorocera comstocki*, Will., has been observed. The larva of *Aegeria* (*Sesia*) *scitula*, Harris, bores under the bark of the trunk. Pupation occurs during April, the pupal stage lasting from 10 to 16 days. Young larvae are found in August, and the winter is passed in this stage. *Oncideres cingulatus*, Say, can best be controlled by gathering and burning the severed twigs during the winter, this method being also recommended against *Elaphidion villosum*, F. The larvae of *Chrysobothris femorata*, F., were parasitised by *Horismenus* sp., but birds are apparently more important in the natural control of this Buprestid. Trees showing signs of winter injury are occasionally infested with *Xyleborus saxeseni*, Ratz., *X. affinis*, Eichh., and *Xylobiops basilare*, Say. A heavy application of whitewash has proved effective in preventing the beetles from entering the trunks for oviposition.

A list is given of miscellaneous feeders upon living, dead, or dying parts of pecan trees, classified under their various orders, with a schedule of control measures for pecan pests.

Hough (W. S.). **Biology and Control of Comstock's Mealy Bug on the Umbrella Catalpa.**— *Virginia Agric. Expt. Sta.*, Tech. Bull. 29, 27 pp., 5 diagrs., 7 figs. Blacksburg, Va., February 1925. [Received 29th September 1925.]

Pseudococcus comstocki, Kuw., has become a serious pest in Northern Virginia only since the use of *Catalpa* for lawn and street planting became widely established. This is its favourite food-plant, but it is also common in Virginia on apple, privet, Boston ivy [*Parthenocissus tricuspidata*], *Weigelia* and *Photinia villosa*, though it only amounts to a pest in the case of the last two. A list is given of all the known food-plants. The only greenhouse food-plant recorded is *Ampelopsis heterophylla*.

This mealybug is known to occur in Japan, China and the Canary Islands. The injury to *Catalpa* is caused by the secretion of honeydew, which gives the tree a spotted appearance, and by feeding. As the insects approach the adult stage, there is a tendency for them to migrate from the leaves and tender branches to the more hardened growths, including the upper part of the main trunk. At the point of feeding a knot-like gall is produced, and this continues to grow as long as feeding is not interrupted. Though the insects can be reared on apple seedlings in the insectary, no galls appear on this plant.

The appearance of the insect and the proportion of sexes is discussed. The eggs are embedded in masses of white cotton-like wax threads; they hatch in from 8 to 21 days, according to the time of year, and the period from hatching to maturity occupies from 4 to 6 weeks. In the spring and summer the adults feed for 10–15 days before depositing eggs and even longer in the autumn. In northern Virginia there are three distinct generations, without any overlapping of the egg-laying period. The winter is passed in the egg stage. Some of the eggs laid by the second generation adults hatch in the following spring at the same time as those laid by the adults of the third.

Three species of ants, *Prenolepis imparis*, Say, *Formica pallidefulva* var. *nitidiventris*, Emery, and *Cremastogaster lineolata*, Say, are

associated with *P. comstocki* in Virginia, but only the last-named attempts to protect the mealybug in any way. The larvae of *Chrysopa rufilabris*, Burm., and *Hemerobius stigmaterus*, Fitch, have been seen attacking the mealybugs; the only other natural enemy observed in Virginia was the fungus, *Cordyceps clavulata*, which destroyed about 5 per cent. during August and September.

The trees should be sprayed in the dormant season with a lime-sulphur or oil spray, but before the spray is applied the main branches should be pruned back to 18 inches, all the old leaves removed and burnt, and the cracks, crevices and bark thoroughly cleaned with a wire brush. Summer control may be obtained by a thorough brushing out of the centre of the head of each tree, burning all the accumulated leaves and cleaning the bark with a wire brush. If these measures are applied at the right time (first week in August in a normal season, and about 1st September in a cool late summer such as 1924), the third generation will be so reduced that little or no injury will be seen. In the summer, instead of using a wire brush, the insects may be knocked off the tree by water under a pressure of at least 250 pounds, but this method is not generally recommended.

Leach (B. R.). U.S. Bur. Ent. **Control of Japanese Beetle in Lawns.**—*Pennsylvania Dept. Agric.*, Gen. Bull. 410, 12 pp., 6 figs. Harrisburg, Pa., 15th August 1925.

Two formulae for carbon bisulphide emulsion have given success against the Japanese beetle [*Popillia japonica*, Newm.] in lawns; the first is the more readily obtainable, but has the disadvantage of separating or stratifying if kept. It consists of 1 part (by volume) of cold-water-soluble resin fish-oil soap to 3 of water, which are placed in a wooden butter churn or ice-cream freezer and churned until an even mixture is obtained; 10 parts (by volume) of carbon bisulphide are then added and churned for about 2 minutes until the mixture emulsifies. In the other, a soap solution is made by adding to 135 cc. of 7 per cent. sodium hydroxide solution, 50 gm. powdered resin and 450 cc. of water and agitating thoroughly, after which 50 cc. of oleic acid is added and the mixture again shaken. The best grades of these materials only should be used. To 30 parts of this soap mixture are added 70 parts of carbon bisulphide, and the whole churned until emulsification occurs. As this emulsion will keep without separating, it is more suitable when required in large quantities, as it can be used again and again without shaking. On small lawns, 1 quart of emulsion should be mixed with 50 gals. of water, and applied in a watering-pot with a coarse nozzle at the rate of 1 U.S. quart per square foot. For larger areas an outfit is described consisting of a motor truck or wagon on which is mounted a tank with pump and regulator, the application of the liquid and the manipulation of the nozzle being explained. A much less expensive and clumsy apparatus has been devised in which water from a hydrant passes through a pressure regulator and water meter, and then flows through a pipe, making a jet that shoots across an enlarged chamber and out through a pipe and 1 inch hose. To the enlarged chamber is attached a thin tube ($\frac{3}{16}$ inch diameter) with a needle valve, which extends down into a pail containing the stock carbon bisulphide emulsion. The jet of water, shooting across the enlarged chamber, creates a suction that

draws up the carbon bisulphide emulsion from the container into the enlarged chamber, where it mixes with the main body of water and flows out through the hose. The needle valve is so adjusted by the operator that 1 quart of emulsion is sucked up by each 50 gals. of water passing through the chamber. Besides being much simpler, this apparatus can be worked by two men to give the same results as five men using the tank and pump method. The method of adjusting this machine and of applying the liquid to the lawn is fully explained. The effect of the treatment on grass is also discussed. Vigorous turf is little affected, unless the liquid forms puddles, but weak, severely infested turf may be seriously scorched, particularly in hot weather, and may have to be top-dressed and resown.

GRISWOLD (G. H.). **A Study of the Oyster-shell Scale,** *Lepidosaphes ulmi* **(L.), and one of its Parasites,** *Aphelinus mytilaspidis* **Le B. Part I. Biology and Morphology of the Two Forms of the Oyster-shell Scale. Part II. Biology of a Parasite of the Oyster-shell Scale.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 93, 67 pp., 2 pls., 21 figs., 17 tables. Ithaca, N.Y., July 1925.

This paper contains the results of experiments extending over six years, carried out at Ithaca, New York.

Lepidosaphes ulmi has been recorded from almost every country outside the tropical and arctic regions, and has been found in every one of the United States. Transportation on nursery stock seems the principal means of distribution, wind, birds, and other insects appearing to be almost negligible factors. At Ithaca two forms occur, the apple (or brown) form, on apple, *Acer spicatum* (mountain maple) and four species of *Cornus* (dogwood), and the lilac (or banded) form, on lilac (*Syringa vulgaris*), and a number of shade trees and ornamental shrubs, including American and European ash (*Fraxinus americana* and *F. excelsior*), various Salicaceae, and *Cornus alba*, the last-named being the only plant on which both forms have been found [*cf. R.A.E.*, A, viii, 305; xi, 487]. The form on various other plants was undetermined, that on pear, however, being almost certainly the apple form. All stages, except the male, which is of exceedingly rare occurrence, and was not found, are described and illustrated. Throughout, the lilac form is slightly larger than the apple one, although the scale of the latter, which is of a uniform brown colour, is longer and more slender than that of the former, which is traversed by distinct light bands.

The larvae hatch during May or June and settle down on the twigs in 1–2 hours, their scales being completed in 36–48 hours. On lilac they settle on the new growth, while on apple they avoid it, probably on account of its pubescence, preferring irregularities of the bark. There are two larval stages, and the two forms become distinguishable after the first moult. The adult female is produced at the second moult, 5 or 6 weeks after the eggs hatch, and begins its scale after 4 or 5 days; oviposition begins about a month later, and continues for about a month. The number of eggs averages about 60–70. The females are generally all dead by the end of October, and their dried bodies remain under the anterior ends of the scales through the winter. Both forms are single-brooded at Ithaca, although, according to Glen, the apple form is double-brooded in Illinois. The occurrence of scales on apple fruit is accounted for by the fact that at the time of emergence

of the larvae the young fruit has already set. The apple form is in advance of the lilac form by about a fortnight throughout the life-history.

Transfer experiments showed that the apple form could complete its development from the egg to the adult on lilac and poplar and certain other plants attacked by the lilac form, although similar experiments in transferring the lilac form to apple and pear failed. The scales made by the apple form on the new food-plants were all of the typical brown colour.

Webster has shown that extremely cold weather kills the eggs [*R.A.E.*, A, iii, 572], and certain birds have been recorded as feeding on *L. ulmi*. Mites, which are an important factor in natural control in certain places [*R.A.E.*, A, vii, 242], are quite unimportant at Ithaca.

The followiug Chalcids were reared by the author: *Anabrolepis zetterstedti*, Westw., from the lilac form; *Aspidiotiphagus citrinus*, Craw, and *Aphelinus fuscipennis*, How., from the apple form; and *A. mytilaspidis*, Le B., and *Chiloneurus diaspidinarum*, How., from both forms. Of the last three, all of which are external parasites of the eggs, second stage larvae, and young females, *A. mytilaspidis* and *C. diaspidinarum* were the most important. *Aspidiotiphagus citrinus* is an internal parasite; its larvae kill the adult females shortly before they begin oviposition, and the adults emerge a few weeks later.

The second part of the paper deals with the biology of *Aphelinus mytilaspidis* [*R.A.E.*, A, iv, 241], which is the most important parasite of *L. ulmi* at Ithaca, as in many other parts of the United States; it is widely distributed in North America, Europe, and Asia, and has been recorded from a number of Diaspine Coccids, but from no other group. At Ithaca there are 3 or possibly 4 generations a year, the adults from the hibernating larvae emerging, normally, in the first half of June, and ovipositing on the second stage larvae of the host.

Power (F. B.) & Chesnut (V. K.). **Alkaline Reaction of the Cotton Plant.**—*Science*, lx, no. 1557, p. 405. Garrison, N.Y., 31st October 1924.

The alkalinity of the dew of the cotton plant is believed to be attributable, at least in part, to the presence of ammonia and trimethylamine, since the presence of these substances has been determined in it, and they have also been obtained in very much larger amounts from the products of distillation of the cotton plant with steam. Both ammonia and trimethylamine are emanations from the plant, and the latter possesses a particular attraction for the boll weevil [*Anthonomus grandis*].

Frost (S. W.). **A Study of the Leaf-mining Diptera of North America.**—*Cornell Univ. Agric. Expt. Sta.*, Mem. 78, 228 pp., 14 pls. Ithaca, N.Y., August 1924. [Received 23rd September 1925.]

The object of this paper is to bring together the many scattered notes on the various species of Dipterous leaf-miners and to summarise the work of several years on their bionomics, in both the field and the laboratory. The North American species are represented by 6 families and 11 genera, many of which are entirely of the mining habit.

Lists are also given of the Hymenoptera parasitic on Dipterous leaf-miners, and of the leaf-mining Diptera of the world and their food-plants.

The new species described include *Agromyza ulmi* on *Ulmus americana*, *Phytomyza lactuca* on *Lactuca scariola* var. *integrata*, and *P. plumiseta* on *Aquilegia canadensis* and *Thalictrum polygamum*, from the United States.

RAINE (N. R.). **The Greatest War of All.**—*Maclean's Mag.*, xxxviii, no. 17, pp. 20–21 & 68, 6 figs. Toronto, 1st September 1925.

This is a popular account of the Government work against insect pests in Canada. The ravages caused by the more important pests are briefly reviewed, the annual loss in Canada being estimated at over £20,000,000. The organisation of the various branches of the campaign against insect pests is discussed, including such departmental work as the investigation of insecticides, the inspection of imported plants, etc., and the breeding of parasites.

ROSS (W. A.). **Some Important Grape and Stone Fruit Insects.**—*56th Ann. Rept. Fruit Growers' Assoc. Ontario, 1924*, pp. 58–61. Toronto, 1925.

A short account is given of some of the more noteworthy vine and orchard pests observed in Ontario in 1924 [*cf. R.A.E.*, A, xii, 537; xiii, 188].

Cherry fruit-flies [*Rhagoletis* spp.] may be controlled by spraying with 1½ lb. lead arsenate in 40 gals. lime-sulphur or Bordeaux mixture as soon as the early cherries begin to show colour. The same spray should be repeated after about 14 days, or the same amount of lead arsenate applied in 40 gals. of water. The first of these sprays will also control the cherry slug [*Caliroa limacina*, Retz.].

BOURCART (E.). **Insecticides, Fungicides and Weed Killers.**—2nd revd. & enl. English edn., demy 8vo, xii+431 pp., 84 tables, 13 figs. London, Scott, Greenwood & Son, 1925. Price 15s. net.

The first edition of this work was a translation from the French, revised and adapted to British standards, and was published in 1913. This second edition has been prepared by T. R. Burton, and a certain amount of fresh matter has been included as a result of recent work, particularly in U.S.A. In most instances, however, a conservative attitude has been maintained, and, except perhaps in the case of comparatively little-known materials, the new methods given have been thoroughly tested and have usually been recommended officially.

The subject is dealt with under the headings of the various chemicals to be used. In the case of insecticides the properties of and methods of using the various materials are indicated, and their effect on the plants and insects is discussed, brief notes being included on the insects against which they may be employed.

Unfortunately, numerous inaccuracies may be observed in the spelling of the scientific names of both insects and plants, and in some cases the same species is referred to different genera in different parts of the book; the popular names are not always properly translated from the French, so that, for example, the pear Tingid is in some places referred to as a tiger-beetle.

The index, also, is not very satisfactory, if the book is to be used as a work of reference. Thus paraffin has only one reference in the index; the fact that its main uses as an insecticide are dealt with under petroleum not being indicated even by a cross reference, while the opening pages of the chapter on petroleum are not indexed under the general heading at all. Nicotine sulphate is referred to the wrong page in the index, and is not clearly separated from nicotine, either in the table of contents or the subject matter, though a considerable amount of information about it is given.

RAMBOUSEK (F.). **Ueber die Rübenschädlinge im Jahre 1924.** [Beet Pests in Czechoslovakia in 1924.]—*Zeitschr. Zuckerind. d. cechoslow. Republ.*, xlix, nos. 35–38, pp. 267–272, 275–279, 283–288, 291–295, illus. 1925. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxv, no. 5–6, pp. 247–249. Stuttgart, 1925.)

The weevil, *Bothynoderes punctiventris*, Germ., lays 3–5 eggs singly in the ground. The larvae hatch in 3 days and feed for 3 months on sugar-beet. Spraying with barium chloride is effective, but expensive. In rainy weather the adults become infested with a fungus, *Botrytis bassiana*. Other weevils on beet are *Otiorrhynchus ligustici*, L., *O. raucus*, F., *O. laevigatus*, F., *O. ovatus*, L., *O. orbicularis*, Hbst., *Chromoderus fasciatus*, Müll., *Sitona gressoria*, F., *Tanymecus palliatus*, F., *Psalidium maxillosum*, F., and *Sphenophorus striatopunctatus*, Gze., the last-named being a new pest in Slovakia.

Wireworms were a serious pest everywhere. The adults should be collected on trap-plants of carrot. Melolonthid larvae carry heart-rot in beets and may by this means destroy 50–75 per cent. of the crop. The Cryptophagid, *Atomaria linearis*, Steph., a dangerous pest, is best dealt with by means of traps and the mixture of strong-smelling artificial manures or naphthaline with the beet-seed. *Chaetocnema tibialis*, Ill., *C. concinna*, Msh., and *Phyllotreta atra*, F., are the flea-beetles that are most injurious to beet foliage; *Meligethes aeneus*, F., is only occasionally harmful. The beet-fly [*Pegomyia hyoscyami*, Panz.] continues to be a serious pest. Its parasites in Czechoslovakia are *Opius nitidulator*, Nees, and *Apanteles congestus*, Nees.

RAMBOUSEK (F.). **Schädiger und Krankheiten der Zuckerrübe vom 20. April bis 19. Mai 1925.** [Pests and Diseases of the Sugar-beet in Czechoslovakia from 20th April to 19th May 1925.]—*Prager Zuckermarkt, Beilage d. Zeitschr. f. Zuckerind. d. cechoslow. Republ.*, xlix, nos. 35–38, pp. 369, 380, 394, 406–407. Prague, 1925. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxv, no. 5–6, p. 249. Stuttgart, 1925.)

Atomaria linearis, Steph., can be trapped in heaps of freshly-mown grass laid between the rows of sugar-beet. It is not yet certain whether *Haltica lythri*, Aub., will become a real pest of beet.

KNECHTEL (W. K.). **Thysanoptere din România. Studiu monografic.** [The Thysanoptera of Rumania. A Monographic Study.]—*Bulet. agric.*, ii-iii, pp. 1–235 & Suppmt. viii, 53 figs., 24 pls. Bukharest, 1923. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxv, no. 5–6, p. 249. Stuttgart, 1925.)

Besides the species already noticed [*R.A.E.*, A, xi, 288] the following injurious Thysanoptera are recorded from Rumania:—*Limothrips*

denticornis attacking the ears of rye ; *Heliothrips haemorrhoidalis* on leaves of *Codiaeum* ; *Dendrothrips ornatus* on leaves of *Syringa chinensis* ; and *Aptinothrips rufus* on the ears of *Holcus lanatus*.

KRONEDER (A.). **Ein Schildlausfeind.** [A Coccid Foe.]—*Zeitschr. Garten- u. Obstbau*, iv, p. 5. Vienna, 1924. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxv, no. 5–6, pp. 262–263. Stuttgart, 1925.)

An ant, *Acredula caudata*, is useful in destroying the eggs of *Lecanium corni* on plum, etc., in Lower Austria.

ESCHERICH (K.). **Eine Reise ins norddeutsche Eulengebiet.** [A Journey in the North German Districts infested by the Pine Moth.]—*Forstwiss. Zentralbl.*, xlvii, pp. 2–20, 53–66, 10 figs., 1 map. (Abstract in *Zeitschr. Pflanzenkr. & Gallenk.*, xxxv, no. 5–6, pp. 276–277. Stuttgart, 1925.)

In 1924 *Panolis flammea* (*piniperda*) infested some $1\frac{1}{4}$ million acres of forests in North Germany. Secondary pests such as *Pissodes piniphilus*, *Acanthocinus aedilis*, *Myelophilus piniperda*, and *M. minor*, occur when the trunks of injured pines are felled. Measures should be taken to increase the numbers of the ant, *Formica rufa*. Other natural enemies include the egg-parasite, *Trichogramma evanescens*, and the Tachinid, *Panzeria rudis*, and a number of Hymenoptera infesting the larvae.

RENSCH (B.). **Zur Frage der Nematodenbekämpfung.** [A Contribution to the Question of Nematode Control.]—*Zuckerrübenbau*, vii, 1925, pp. 24 et seqq. (Abstract in *Centralbl. Bakt., Paras. Infekt.*, IIte Abt., lxv, no. 6–13, pp. 222–223. Jena, 25th September 1925.)

An account of the present state of work against Nematodes is followed by a brief description of the life-history of *Heterodera schachtii*, Schm. The author has adopted a method of counting the cysts, based on that of Baunacke, in order to determine the extent of infestation. A mixed sample of soil is taken in winter at a depth of 4–10 inches. If 75 grms. of this contains more than 120 cysts of which 15 per cent. are occupied, the soil is considered heavily infested. A content of 60–120 cysts represents an average infestation, and less than 60 cysts a slight infestation. The previous crop must have been one of average susceptibility to attack, otherwise the figures may be higher or lower. Nematodes cannot thrive in very sandy soil, or in pure clay ; otherwise geological conditions are not involved. The frequent cultivation of beet increases infestation. Cereals, except rye, and peas only enable Nematodes to maintain their position. Chicory seems to contain substances injurious to Nematodes, and lucerne and other fodder plants also decrease infestation. The measures that have been advocated hitherto have been unsuccessful, partly on economic grounds. The author's plan of using attractive baits [*R.A.E.*, A, xiii, 102, 210] has failed in the field. Crop rotation, weeding and early sowing are the only means of reducing infestation.

ZACHER (F.). **Korn-, Reis- und La Plata-Maiskäfer.** [*Calandra granaria, C. oryzae* and *C. zea-mais.*]—*Marktbericht Hansablum—die Fachkunde,* 1925, no. 4, pp. 33–34. Hamburg, 1925.

Much of the information on the grain weevils, *Calandra granaria,* L., *C. oryzae,* L., and *C. zea-mais,* Motsch., in this article is included in papers already noticed [*R. A. E.*, A, ix, 139; xii, 40, 41]. The author's experiments with the method of stacking fresh hay for some weeks in granaries in order to prevent injury by *C. granaria* show that little reliance can be placed in this measure.

VIETINGHOFF VON RIESCH (A. Frhr. von). **Die Kieferneule.** [The Pine Moth.]—*Die kranke Pflanze,* i, no. 1, pp. 3–5, 1 fig. Dresden, 1st April 1924. [Received 10th October 1925.]

This is a brief account of bionomics and control of the pine moth, *Panolis flammea.*

NAUMANN (A.). **Zeitschlüssel wichtiger Schädlinge.** [Annual Life-history Charts for important Insect Pests.]—*Die kranke Pflanze,* i, no. 4, pp. 61–63. Dresden, 1st July 1924. [Received 10th October 1925.]

This is a table showing the occurrence in the various months of the year of the different developmental stages of the important insect pests in Germany.

BAUNACKE (W.). **Die Rapsglanzkäfer und ihre Bekämpfung.** [The Rape Beetles and their Control.]—*Die kranke Pflanze,* i, no. 4, pp. 64–67, 2 figs. Dresden, 1st July 1924. [Received 10th October 1925.]

The bionomics and control of *Meligethes aeneus,* F., the best known of the rape beetles in Germany, are briefly described.

BAUNACKE (W.). **Obstwickler, kleiner Frostspanner und Apfelbaum-gespinstmotte. Die Bekämpfung des kleinen Frostspanners** (*Cheimatobia brumata,* **L.**). [*Cydia pomonella, Cheimatobia brumata* and *Hyponomeuta malinellus.* Measures against *C. brumata.*]—*Die kranke Pflanze,* i, nos. 5 & 6, pp. 85–87, 112–113. Dresden, 1st August & 1st September 1924. [Received 10th October 1925.]

Brief accounts are given of *Cydia* (*Carpocapsa*) *pomonella,* L., *Cheimatobia brumata,* L., and *Hyponomeuta malinellus,* Zell., on apple, and of the measures needed against them.

TEMPEL (W.). **Auftreten von Kleestengelbrenner und Kleewurzelhals-fliege.** [An Occurrence of the Clover Fungus, *Gloeosporium caulivorum,* and of the Clover Fly, *Psila atra.*]—*Die kranke Pflanze,* i, no. 7, pp. 132–133. Dresden, 1st October 1924. [Received 10th October 1925.]

Withering of the stalks of clover observed near Chemnitz, Saxony, and first ascribed to the fungus, *Gloeosporium caulivorum,* with which the plants were infected, was found to be caused by the larvae of the

fly, *Psila atra*, Mg., mining in the root-collars. In one field 30–40 per cent. of the plants were injured. The larvae of a weevil, *Sitona lineata*, L., were noticed attacking the outside of roots of clover plants infested with this fly.

NAUMANN (A.). **Erdbeerkulturen durch eine Milbe gefährdet.** [Strawberry Cultivation endangered by a Mite.]—*Die kranke Pflanze*, i, no. 7, pp. 134–136, 4 figs. Dresden, 1st October 1924. [Received 10th October 1925.]

The strawberry mite, *Tarsonemus fragariae*, Zimm., is a serious pest in some parts of Saxony. Spraying is unsatisfactory, as it is very difficult for sprays to reach the mites in the folded leaves. Plants from infested plots should not be taken for planting elsewhere, and if beds of old plants are severely infested, the ground should be cleared and other crops planted.

LANDGRAF (–). **Die Fliedermotte** (*Gracilaria syringella*, **F.**). [The Lilac Moth, *G. syringella*.]—*Die kranke Pflanze*, i, no. 9, pp. 173–174, 2 figs. Dresden, 1st December 1924. [Received 10th October 1925.]

Gracilaria syringella, F., which is a well-known pest of lilac (*Syringa vulgaris*) [*cf. R.A.E.*, A, xiii, 577], also attacks privet (*Ligustrum*) and ash (*Fraxinus*). Only older lilac plants are attacked. Pupation begins in October and takes place in the ground, so that cultivation exposes the pupae to frosts and birds and other enemies.

BLUNCK (H.) & LUDEWIG (K.). **Empfiehlt sich späte Bestellung der Winterung nach starkem Fritbefall der Sommerung?** [Is late Sowing of Winter Crops advisable after a heavy Infestation of the Summer Crops by the Frit Fly?]—*Georgine, Land- u. Forstwirtschaftl. Zeitung*, no. 73, reprint, 4 pp. [*sine loco*] 12th September 1925.

It has been considered doubtful in East Prussia whether delayed sowing in autumn of winter cereals is not advisable after a severe summer infestation by the frit fly [*Oscinella frit*]. Data collected from 1921 to 1925 show that an abundance of adults in spring does not necessarily imply that the flies will be very numerous in summer. Their numbers depend on the weather in May, July and August, *i.e.*, the flight-periods of the three generations, hot, dry weather favouring development, though shortening the life of the adult. Heavy, repeated rains injure the flies and cause the flight period to end prematurely. These effects are more particularly noticeable in the last generation. A heavy infestation of summer crops does not therefore necessarily involve a prolongation of the flight-period in autumn. The duration of the flight of the last generation is probably determined chiefly by the weather in September. If the weather is warm the flies will probably die at the usual date, and the winter rye can be sown at the usual time. This will also hold good if heavy rain and storms occur in the first half of September. If September proves cool and dry, a prolongation of the flight-period may be expected.

Amtliche Pflanzenschutzbestimmungen. [Official Regulations on Plant Protection.]—*Nachrichtenbl. deutschen. Pflanzenschutzdienst.*—Beilage, no. 3, pp. 33–48. Berlin, 1st October 1925.

The preceding part has already been noticed [*R.A.E.*, A, xiii, 148]. This issue includes a résumé of German legislation on the importation of living plants; a list of German customs houses where plants other than grape-vines can be passed; the Prussian police regulations on the control of bark-beetles; and the Dutch regulations on traffic in dried bulbs, etc.

Hutchings (C. B.), Cosens (A.), Detwiler (J. D.) & Hudson (H. F.). **Report on Insects of the Year.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 8–13. Toronto, 1925.

A number of common pests are recorded from Ontario during 1924. *Paraclemensia acerifoliella*, Fitch (maple leaf cutter) was exceedingly abundant throughout Quebec and Ontario, the leaves of trees around Ottawa and in the eastern townships being severely damaged, particularly sugar maples [*Acer saccharum*], which were completely stripped of their foliage, and beech.

Criddle (N.). **Lessons from the Grasshopper Outbreak of 1919-23 in Manitoba.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 13–16. Toronto, 1925.

The grasshopper outbreak of 1919–23 in Manitoba began with a small infestation by *Camnula pellucida*, Scudd., in parts of Manitoba and Saskatchewan, and spread enormously, particularly westward over Saskatchewan and southern Alberta, the original species gradually giving way to *Melanoplus* spp., especially *M. atlantis*, Riley. Observations showed that *C. pellucida* always returns from the grain-fields for oviposition in definite sod areas, while *Melanoplus* spp. choose stubble or grass fields, ovipositing around the small bare openings rather than actually in grass clumps. Natural enemies were found to vary in usefulness in different parts of the country and in different years. In Manitoba, the most important enemy was the Bombyliid, *Systoechus vulgaris*, Lw., the larvae of which eat grasshopper eggs, other enemies being blister beetles, Sarcophagids and the fungus, *Empusa grylli*, and, to a less degree, a mite, *Trombidium* sp., the Carabid, *Percosia obesa*, Say, and the Scelionid, *Scelio calopteni*, Riley. In Alberta and Montana, Sarcophagids were of more value than Bombyliids. Gulls, particularly Franklin's gull, were of great value within an area of 20 miles from their breeding-places. Crows and other birds, particularly those that gather in flocks, were helpful in destroying numbers of the grasshoppers.

Mechanical contrivances for catching the insects were of small value compared with poison baits; and both fruit and amyl acetate as attractants were discarded as unnecessarily expensive, salt being then used as the only flavouring [*R.A.E.*, A, xii, 451]. Horse-dung proved to be one of the best baits on small areas, but its use is not practical with mixing machines used on a large scale. Wide variations in results might be explained by different climatic factors and the kind of water used in mixing, but one of the most important factors in bait application is undoubtedly temperature. The insects were found to be practically inactive at temperatures below 65° F. in the shade, even when the

sun was shining. As the temperature rose, the grasshoppers congregated in the sun, at 68° they began to feed, reaching their maximum activity at 78°. At 85° they still ate hungrily, but at 90° feeding stopped, and they began to seek shelter; at 96° the only attractant was water. Unusually good results may frequently be attributed to the bait having been accidentally applied at just the right time. Sunlight is considered a desirable factor, though not essential.

Mixing machines proved an undoubted improvement over mixing the baits by hand, not only in saving time but also in ensuring an even mixture.

Ross (W. A.) & Hall (J. A.). **The Rose Chafer and Farm Management.** —*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 16–19. Toronto, 1925.

Investigation has demonstrated that the control of the rose chafer [*Macrodactylus subspinosus*, F.] is a matter of farm management. Spraying with 3 lb. powdered lead arsenate, 1 gal. cheap molasses and 40 gals. water is considered of value, but only as a means of protecting vineyards, orchards, etc., from serious injury until the pest has been brought under control by farm methods. The plough, disc and cultivator are the most important weapons in reducing the numbers of chafers, and they can be used most effectively in late May and early June (when the land should be prepared for maize and potatoes), in mid-July (when preparing for buckwheat and ploughing under old strawberry patches), and in late autumn when ploughing is commonly done. Examples are given of actual experiments in which the numbers of chafers in the pre-pupal and pupal stages (May-June) and in the egg stage (July) have been reduced by large percentages (over 70 per cent.) by these means, while autumn ploughing has largely decreased the number of larvae. Cultivation in spring prior to the pre-pupal or dormant stage has, however, little or no effect in reducing the numbers. *M. subspinosus* does not occur in land shaded by trees, or breed to any extent in cultivated crops or fields of clover. The most important (and most difficult) step in fighting the beetle is to reduce the breeding places, which are generally in waste, sandy places, and these are best treated by bringing them under cultivation, by growing lucerne or sweet clover, or by reforestation.

Hutchings (C. B.). **The Lilac Leaf-miner, *Gracilaria syringella*, Fabr.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 19–23. Toronto, 1925.

Lilac in Canada is severely injured by the larvae of the moth, *Gracilaria syringella*, F., which emerges in May and deposits eggs in groups of from 5 to 10 on the lower surface of the leaves, next to the axils of the veins. The larvae hatch in a week and bore between the upper and lower epidermis, causing discoloured spots and characteristic, bladder-like mines. After about three weeks the larvae leave the mines, come to the exterior and curl the leaves, generally from the apical ends, fastening the roll down with silken strands. Ten days later they mature, drop to the ground on a fine thread and pupate in rubbish or earth. After two weeks the moths emerge; and the second

generation attacks the leaves more severely than the first, often destroying the foliage completely. The whole life-history occupies a little over 7 weeks.

Nicotine sulphate sprays were found very effective, killing both the larvae in the mines and those in the rolled leaves. When the leaves first show spotting, generally early in June, 1½ tablespoonfuls to 1 gal. water should be applied as a fine spray, covering the branches above and below, and this should be followed two weeks later with a solution of 2 tablespoonfuls per gallon to obtain maximum results. Picking and burning the spotted leaves early in the season would probably check the pest to some extent. The various degrees of attack generally noticed on different varieties of lilac are discussed.

GIBSON (A.). **Notes on the Occurrence of the Lesser Grapevine Flea-beetle in Canada.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 23–24. Toronto, 1925.

Haltica (*Altica*) *woodsi* (lesser grapevine flea-beetle) caused an outbreak of economic importance at Ottawa in 1917, larvae and adults being found in numbers on the foliage of Virginia creeper. Eggs were deposited singly near the larger veins, and those collected on 8th June hatched on 15th June, and by the 30th many larvae were mature and were entering the earth. Pupation occurred near the surface. The larvae fed almost entirely on the lower surface of the leaves. Eggs of a second generation were deposited in breeding jars about 15th August, indicating that two generations may occur in some years.

PETCH (C. E.) & HAMMOND (G. H.). **Notes on Insect Parasites of *Phyllophaga anxia* in the Province of Quebec.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 24–28. Toronto, 1925.

Notes are given on the insect parasites of the white grub, *Lachnosterna* (*Phyllophaga*) *anxia*, Lec., which, during the past ten years or more, has caused serious losses to field and garden crops in the Province of Quebec. *Tiphia inornata*, Say, was found to give an average control, from all types of soil, of about 13·2 per cent. Hibernation of this species occurs mainly in the prepupal stage within the cocoon. The duration of the life-cycle in Quebec is not definitely known, but it possibly occupies more than one year. No hyperparasites were reared. *Pelecinus polyturator*, Drury, was not uncommon, but no immature stages have been found. *Microphthalma phyllophagae*, Curran, was reared in numbers, and no hyperparasites were discovered, but the spider, *Aglaope trifasciata*, was found to be predacious on the adults. This Tachinid was by far the most active in loose manured soil, causing as much as 15·4 per cent. parasitism. The fly apparently deposits living larvae on the surface of the soil or in crevices; hibernation occurs within the host in the young larval stage, and development proceeds slowly during the latter part of the season. It is possible that the bacterial disease, *Micrococcus nigrofaciens*, may be introduced into the host by this parasite, but this has not been definitely proved. All the grubs in one district were infested with the hypopial nymphs of a species of *Tyroglyphus*; a much less common mite was *Rhizoglyphus phylloxerae*, Riley.

Curran (C. H.). **Note on *Ptinus fur*, L., and *villiger*, Reit., as Stored Product Pests in Canada.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 28–29. Toronto, 1925.

Stored flour, maize, etc., in the Prairie Provinces is attacked by the beetle, *Ptinus villiger*, Reit. A new generation emerges in about $3\frac{1}{2}$ months, at a temperature of about 85° F. Infested flour becomes granular or flaky or even stringy when badly injured; the full-grown larvae form a ball of flour in which to pupate. *P. fur*, L., has been reported as attacking flour and other stored products such as bran, shorts and grain. It is also a pest in museums, attacking insect specimens and stuffed birds.

Metcalf (C. L.). **Warfare against the Insects.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 30–46. Toronto, 1925.

It is estimated that in America alone insects cause damage amounting to over £200,000,000 a year. The total loss in staple crops in the United States is placed at about £165,000,000, of which nearly £90,000,000 worth occurred in cereal crops; vegetables were injured to the extent of some £13,000,000; fruit suffered a loss of some £8,000,000; nursery and greenhouse products £1,500,000; stored products £60,000,000; forest trees and products £26,000,000. The estimated loss in live-stock production is £28,000,000, while the economic loss from insects that carry human diseases is thought to be about £15,000,000; and entomologists are forced to conclude that unless insects are more efficiently controlled in the future, they may eventually threaten the very existence of the human race. The methods of accomplishing these various types of injury are discussed, and the advantages that enable insects to survive and to cause such losses are explained. A list is given of the known physical and mechanical measures in use against insects, and notes are added on the more important ones, including a discussion of the insecticides commonly used, the employment of baits, the process of fumigation, etc. Farm practices also are noted, and the utilisation of beneficial insects, and the legislation in force for insect control are reviewed. The greatest need at present is for awakened public interest in insect control; it is believed that in the light of modern knowledge about one-half of the injury done might be prevented. Another great need is for more study of the insects themselves. It is thought that only about one-fifth of the kinds of insects that inhabit the earth are so much as named; and of only a fraction of these is any knowledge of the life-history or habits available. Many more entomologists are required to study the structure and bionomics of insects; to improve such known remedies as traps, baits, farm practices, sprays, dusts and fumigants; to exclude foreign pests; and to derive all possible advantage from the beneficial insects in native and foreign countries.

Keenan (W. N.). **The Spread and Degree of Infestation of the European Corn Borer in 1924.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 47–50. Toronto, 1925.

The season of 1924 was unexpectedly favourable for development of the European corn borer [*Pyrausta nubilalis*, Hb.] in Ontario,

and its spread to the north and east indicates the necessity for preventive measures. The history of this moth in Canada and its present distribution are explained, and the degree of infestation in the affected territory is discussed. Lake-shore conditions continue to favour the spread and increase of the pest, the degree of infestation depending on the period of its presence in a region. The maize canning industry suffered more in 1924 than ever before; mechanical huskers had to be abandoned and an extra staff engaged for husking by hand so that infested ears could be separated from uninfested. It has been shown by experiment that maize can be profitably grown in Canada over a much larger area than had previously been anticipated, and therefore the importance of limiting the spread of *P. nubilalis* cannot be over-emphasised.

CAESAR (L.). **Mortality of the Larvae of the European Corn Borer (*Pyrausta nubilalis*, Hübn.) in the early Instars in 1924.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 50–52. Toronto, 1925.

Experiments have shown that in 1924 there was a high degree of mortality among the early instars of *Pyrausta nubilalis*, Hb. (European corn borer), the causes of which have not been worked out [*cf.* next paper]. It is known that heavy rain or heavy winds will dislodge young larvae from the maize plants, and that many of them are unable to get back, and it is believed that a study of the effects of variations of temperature, moisture and light upon both adults and larvae will yield valuable data.

PAINTER (R. H.) & FICHT (G. A.). **A Field Study of the Reduction of European Corn Borer Larvae in Standing Corn.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 53–54. Toronto, 1925.

Experiments to determine the highest seasonal mortality of *Pyrausta nubilalis*, Hb. (European corn borer) in Ontario have shown that it is during the period when the larvae are very small and are attempting to establish themselves that the highest death rate occurs. These young larvae upon hatching make their way into the curled maize leaves, and many are drowned in the water collected here, as they are quite helpless when surrounded by a film of water. Others are flattened to death between the surfaces of the unfolding leaves. An even greater number are brushed or blown off the leaves and, being unable to travel in loose soil, fail to reach another plant. During the next stage, that is while the majority of larvae are still small, the mortality is only about one-half of the above, and it is obvious that the critical period in the life of the larvae is during the first two instars. As soon as practically all of the larvae have become established, the mortality becomes very low, those dying in this period being generally pinched by the breaking over of the stalks where they have been weakened by the borers. The mortality among fully-grown larvae is practically nil. Actual counts showed that about 75 per cent. of those failing to survive are eliminated during the first two instars.

Baird (A. B.). **The Introduction and Colonisation in Ontario of two Hymenopterous Parasites of the European Corn Borer.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 54–56. Toronto, 1925.

The European corn borer [*Pyrausta nubilalis*, Hb.] now infests practically all of the western peninsula of Ontario, and the damage done in 1924 was estimated at more than £200,000. Of the eight parasites that have been introduced into the United States from Europe, two are being tried in Canada. These are the Hymenoptera, *Habrobracon brevicornis*, Wesm., and *Exeristes roborator*, F. An account is given of their parasitic habits and of the method of their liberation.

Ficht (G. A.) & Painter (R. H.). **A Brief Note on Farm Cutting Boxes and Corn Shredders as Factors in the Control of the European Corn Borer** (*Pyrausta nubilalis*, **Hb.**).—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 56–57. Toronto, 1925.

Maize-shredding machines and cutting boxes of various types are in use throughout the maize-growing area of Ontario. The mortality of larvae of *Pyrausta nubilalis*, Hb., in different varieties of maize passed through these is discussed, and in consideration of the high death rate of larvae associated with both processes, too great emphasis cannot be laid on their value.

McLaine (L.). **The Outbreak of the Gipsy Moth in Quebec.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 60–62. Toronto, 1925.

In July 1924, an isolated egg cluster of the gipsy moth [*Porthetria dispar*, L.] was found for the first time in Canada, in Quebec. In September of the same year, a much larger isolated infestation was found in another county, covering at least 600 sq. yards, chiefly in old willows and orchard trees. A vigorous campaign was undertaken, including the usual methods of creosoting egg masses, removing old trees, burning brush, filling in of cavities in healthy trees, etc., and in the spring extensive spraying and banding of neighbouring trees will be carried on, together with the burning over of infested stone walls at the time the eggs hatch. The colony has evidently been established for some years, but it is hoped by these means to exterminate it.

Dustan (A. G.). **A Study of the Methods used in growing Entomophthorous Fungi in Cages prior to their Artificial Dissemination in the Orchards.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 63–67. Toronto, 1925.

In order to obtain supplies of the apple-sucker, *Psylla* (*Psyllia*) *mali*, Schmidb., infested with the fungus *Entomophthora sphaerosperma* earlier in the year than under natural conditions [*cf. R.A.E.*, A, xii, 531 ; xiii, 188, 496] experiments were conducted in rearing the insects in cages in the open. *Lygus communis* var. *novascotiensis*, Knight (green apple bug) and its fungus parasite, *Empusa erupta* [*R.A.E.*, A, xi, 477 ; xii, 495], were also reared in smaller quantities. So far all efforts at growing the two fungi on artificial media have failed.

Three types of small cage were used, to determine which was the most satisfactory ; these were : Frame cages covered with untreated

cotton; similar cages covered with waxed cotton; and wooden-sided cages with cotton tops, and, in addition, movable glass covers. The average size of the cages was 20 in. high by 15 in. wide and 30 in. long; they were built over young seedling apple trees. In most cases the insects to be infected were introduced into the cages as adults, but when it was required to start an epidemic among the nymphs, it was found desirable to introduce eggs during the autumn. The chief source of infection utilised was resting spore material [*R.A.E.*, A, xi, 157] collected in the autumn and kept through the winter in ground cages, but occasionally diseased insects (which were of various families and orders) discharging summer spores were collected. It was found most satisfactory to place the diseased material either on the ground or on the sides of the cages.

To obtain the greatest extent of infestation, high temperature, high relative humidity, and crowding of the insects were necessary; moreover, these three factors are closely inter-related, so that if one is modified the whole balance is upset and fungus growth ceases. Light as a factor was of no importance, except that the fungus failed to develop if it was entirely excluded [*cf. R.A.E.*, A, xiii, 496]. The wooden-sided cages were the most satisfactory for keeping an even high temperature and high relative humidity. The movable glass tops made it possible to control the temperature to a certain extent and were also of use in protecting the insects from rain. An idea of the increased temperature obtaining in the cages is given by the records, which show that when the maximum shade temperature outside was about 80° F., the untreated cotton cages showed a maximum of 85°, the wooden-sided cages a maximum of 91°, and the waxed cotton cages 101°. The minimum temperatures in all the cages stood about 6° higher than the prevailing temperatures at the same time in the open. The temperature in the waxed cotton cages rose so high as to kill the insects.

The best means of increasing the relative humidity was to pour warm water on the soil in the cage 3 or 4 times a day; spraying with water on the walls of the cage or the trees, except in a very fine mist, was liable to drown the insects. The average mean humidity in the three types of cage was: Untreated cotton cage, 72%; waxed cotton cage, 74%; wooden-sided cage, over 80%. Adverse weather conditions caused the growth of the fungus to be atypical, or else stopped it entirely.

Large cages 6 ft. high by 3 ft. square were used for obtaining a more extensive supply of diseased material as soon as the fungus had reached the fruiting stage in the small cages. When the disease becomes epidemic in the large cages, diseased material should be collected and distributed in a low, thickly-planted orchard, whence the fungus may spread widely into the surrounding country.

Fox (H.). **Notes from a Study of** *Nepticula pomivorella*, **Packard.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 67–70, 2 figs. Toronto, 1925.

Nepticula pomivorella, Pack. (serpentine leaf miner) was very abundant in London, Ontario, in 1924 on apple trees. The peculiar, serpentine form of the mine, produced largely owing to the insects' reluctance to cross the larger veins on the leaves, is described. Feeding occurs chiefly in the palisade tissue, the young larva eating through the

lower epidermis and spongy parenchyma to this tissue, where the mine is constructed. As these observations were only begun in October, the full life-history could not be observed, but a description of the fourth larval instar is given. Before pupation the larva leaves the leaf and migrates to a twig, where it spins a cocoon. An unidentified Hymenopterous parasite was observed on the larva, attaching itself to the side of the host and feeding on the body juices.

HUDSON (H. F.) & WOOD (A. A.). **Notes on the Life History of the Lesser Clover Weevil** (*Phytonomus nigrirostris*).—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 71–73. Toronto, 1925.

Hypera (*Phytonomus*) *nigrirostris* (lesser clover weevil) has during recent years been increasing in western Ontario. The beetles hibernate in clover fields, especially where clover débris is abundant. Oviposition begins in early May, and the incubation period is very variable according to the temperature, the minimum recorded being 5 days and the maximum 23. The larval period averages about 20 days, the pre-pupal period 3 days and the pupal 5. The cocoons are generally spun in clover heads, in the axils of leaves, or on dead leaves at the base of the plant. There is only one generation a year ; beetles have occasionally been collected in August and early autumn, but no eggs have been found at that time. The adults prefer red and mammoth clover, the leaves of which they riddle, but are occasionally found in lucerne or sweet clover fields. The larvae attack the newly forming buds and prevent the heads from developing, but in spite of this the crop from a fodder standpoint is scarcely injured, so that the pest is not at present considered one of great economic importance.

MAHEUX (G.). **Entomology in the Rural Schools in the Province of Quebec.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 73–75. Toronto, 1925.

Efforts are being made to encourage the dissemination of entomological knowledge in the rural schools. Competitions have been opened and prizes offered for collections of insects made by school teachers, and these competitions are being carefully graded with the object of increasing interest in and knowledge of entomology, particularly of the economic aspect of the subject.

TWINN (C. R.). **Observations on the Host-selection Habits of** *Pieris rapae*, **L.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 75–80. Toronto, 1925.

Some examples are cited of adaptations of insects from wild to cultivated plants, and it is suggested that certain important aspects of the relation of phytophagous insects to their food-plants have been much neglected. A study, covering two seasons, has been made in Ottawa of the habits in food-plant selection of *Pieris rapae*, L. (cabbage butterfly), which feeds on both wild and cultivated plants belonging to the orders Cruciferae, Resedaceae, Capparidaceae and Tropaeolaceae. Cultivated cabbage is the preferred food, but in the spring when this is lacking cruciferous weeds supply the necessary nourishment. Experiments showed the following order of preference for oviposition on five cultivated plants : cabbage 56 per cent. ; radish 19 per cent. ; nasturtium 13 per cent. ; mignonette 9 per cent. ; *Alyssum* 3 per cent. It was thought that if the larvae could be induced to feed for a number

of generations on any one food-plant, the tendency of females to oviposit on that plant would gradually increase and possibly result in the development of either monophagous or more restricted oligophagous habits. Experiments on these lines were by no means conclusive, largely owing to outbreaks of flacherie among the larvae, but they seemed to indicate that the larval food does not influence the selective tendencies of the adult. The increased preference was never very great and only became noticeable when comparing the oviposition records of the different strains on any one food-plant. The fact that larvae were reared on nasturtium, for instance, did not greatly influence the adult's predilection for cabbage, but there was a slight increase in the preference shown for the former plant. Similar experiments in the following year confirmed the order of preference of food-plants to be Cruciferae, Resedaceae, and then Tropaeolaceae. Adults reared on various food-plants showed no noticeable differences in size, colour, or structure, other than the differences that commonly occur in the species. It is thought that the sense of smell plays an important part in the selection of the food-plants of many insects, including certain Lepidoptera. It was remarked some years ago that in the Province of Terek, Russia, where tomatos are planted with cabbages, the latter are never attacked by *P. rapae* [*R.A.E.*, A, iii, 340], but it was proved in 1924 that this is not the case in Ontario, where tomatos gave no protection whatever from this butterfly.

Ross (W. A.). **Miscellaneous Notes on the Pear Psylla Problem.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 80–84. Toronto 1925.

The pear psylla [*Psylla pyricola*] is considered the most difficult to control of the fruit pests in Ontario, so much so that some growers are threatening to give up the cultivation of pears. It is thought, however, that if remedial measures are thoroughly and carefully applied, the trees can be profitably grown on a commercial scale. As the pest thrives best under sheltered conditions, where air drainage is poor, wherever possible the pear orchard should be planted on sloping land with no deep hollows in it and at some distance from high hedges, and there should be no windbreaks in the neighbourhood. The trees should be planted at the maximum distance apart, that is, not less than 25 ft. by 18 ft. Good pruning not only discourages the pest but also allows of better spraying.

The sprays recommended are 4 gals. commercial lime-sulphur with 5 lb. hydrated lime to 40 gals. water against the eggs, applied shortly before the trees bloom; and ½ pint nicotine sulphate in 40 gals. weak Bordeaux (1 : 10 : 40) against the nymphs, applied after the blossoms fall. In years of unusually heavy infestation it may be necessary to apply an extra spray in July, using ½ pint nicotine sulphate and 10 lb. lime to 40 gals. of water. Autumn spraying against the adults is probably far less effectual than that in late March or early April (just before oviposition), when a good miscible oil, such as Scalecide, gives very good results. Attempts are being made to find a cheaper, home-made lubricating oil for this purpose. At present the most promising is a Bordeaux and oil emulsion spray composed of 3 gals. sterling red paraffin oil, 1½ gals. soft water, ⅜ lb. copper sulphate and ⅜ lb. lime, this amount of emulsion being diluted in 95½ gals. water. The necessity for thorough spraying is emphasised; it is essential to use at least 200 lb. pressure and a liberal quantity of spray material.

Ross (W. A.) & Caesar (L.). **Insects of the Season.**—*55th Ann. Rept. Ent. Soc. Ontario, 1924*, pp. 84–88. Toronto, 1925.

Pests recorded during the year in Ontario and not dealt with in recent reports or in special papers in the present series include *Saperda candida* (round-headed apple-tree borer), which is not often a pest of any importance in Ontario, but was troublesome in several orchards ; *Marmara elotella* (bark miner of apple), not apparently an economic pest ; *Caliroa limacina* (*cerasi*) (pear slug) ; *Macrodactylus subspinosus* (rose chafer), on grapes, fruit-trees and ornamentals ; *Haltica* (*Altica*) *chalybea* (grapevine flea-beetle) ; *Metallus bethunei* (blackberry leaf-miner) ; *Myzus ribis* and *Amphorophora lactucae* (currant Aphids) ; *Epochra canadensis* (currant fruit-fly), rarely reported from Ontario ; *Agrotis fennica* (black army cutworm), *Lycophotia scandens* (white cutworm) and *Papaipema nitela* (stalk borer), on various vegetables ; *Pegomyia hyoscyami* (spinach leaf-miner), on spinach, beets, mangels and lamb's quarters [*Chenopodium album*] ; *Pyrameis* (*Vanessa*) *cardui*, so common on Canada thistle that farmers feared that grain crops might be attacked ; *Paratetranychus ununguis* (spruce mite), on blue spruce and balsam fir [*Abies balsamea*] ; and *Eulecanium nigro-fasciatum* (terrapin scale), on soft maple.

Household pests included the carpet beetles, *Anthrenus scrophulariae* and *Attagenus piceus*, and *Tineola* (*Tinea*) *biselliella* (clothes moth).

Harukawa (C.). *Dolerus* **sp.** (**Tenthredinidae**) **feeding on Orchid in Fukuoka Prefecture** (**Preliminary Report**).—*Jl. Plant Prot.*, xii, no. 9, pp. 428–432. Tokyo, August 1925. (In Japanese.)

An account is given of a species of *Dolerus* feeding on orchids. There is one generation a year, the adults emerging in April. The larvae of this sawfly feed on the leaves from May to July and pupate in the ground.

Muramatsu (S.). **Breeding Studies on the Life-histories of Injurious Insects.**—*Korea Agric. Expt. Sta.*, Rept. 13, pp. 1–42, 4 pls. Suigen, Korea, March 1925. (In Japanese.)

The Pyralid, *Melitene bifidella*, Leech, is a pest of pear distributed over Korea and Japan. There is one generation a year, the adults being observed from about the middle of June to the beginning of July. Mating takes place 2–4 days after emergence, the eggs being deposited on the leaves 2–3 days later and hatching in about 2 weeks. One female deposits about 40–50 on an average. The larvae devour the leaves at night, resting during the day in tunnels made of pieces of the leaf, excreta and other material. The winter is usually passed in the third instar, and the larvae begin to feed again at the end of April ; they pupate in June, the adults appearing about 10 days later.

The Curculionid, *Rhynchites heros*, Roel., causes damage to pear, peach and apple, both in Korea and Japan. There is one generation a year, the adults appearing about the middle of June. Mating takes place 3–4 days after emergence, and oviposition 2 days later, the eggs being laid singly in a hole in the fruit, which is closed with liquid secreted from the mouth. After oviposition, the adults cut into the stalks of the fruits, which fall to the ground later. About 35–50 eggs are produced by a female during life. The eggs hatch in a week, and the larvae

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leave the fallen fruits, and enter the ground and feed on the young roots of weeds and decayed vegetables ; they pupate in May, this stage lasting 7–9 days.

Anthonomus pomorum, L., damages Japanese pear [*Pyrus serotina*] throughout Korea and Japan. There is one generation a year, the adults emerging in June ; they hibernate, and mate in the following April. Eggs to the number of 36–50 are laid in holes in the flower buds, 5 days after mating, and hatch in 7–9 days. The larvae devour the contents of the bud, in which pupation takes place, the pupal stage occupying 18–23 days.

Gryllotalpa africana, P. de B., causes damage to various crops all over Japan. The adults and nymphs are present at all seasons, though there is only one generation a year. The adults mate 7–10 days after the last moult, and the eggs are laid 7–12 days later in nests underground and hatch in 22 days. In the first instar the larvae remain in the nests and are fed by their mothers, but in the four later instars they search for food themselves.

VOELKEL (H.). **Ueber die praktische Bedeutung der Schlupfwespe *Trichogramma evanescens* Westw.** [On the practical Importance of *T. evanescens*.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 2, pp. 97–108, 2 figs. Berlin, August 1925. [Received 10th October 1925.]

In the summer of 1924 Lepidopterous pests of cabbages abounded near Berlin, nearly every leaf bearing eggs of *Barathra* (*Mamestra*) *brassicae*, L., *Pieris napi*, L., or *P. brassicae*, L. A great reduction in the crop seemed inevitable until it was noticed that an average of 80 per cent. of the eggs were parasitised by the Chalcid, *Trichogramma evanescens*, Westw. A parasitism of 78–100 per cent. was found generally, the exceptions (38–55 per cent.) being on cabbages growing in the shade of trees. *T. evanescens* exhibits a marked preference for light, so that eggs laid on shaded plants escape parasitism either altogether or until a very late date.

HOUBEN (J.) & HILGENDORFF (G.). **Ueber Obstbaumkarbolineum. I.** [On Fruit-tree Carbolineum. I.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 2, pp. 109–162. Berlin, August 1925. [Received 10th October 1925.]

The history of the production and employment of carbolineum, the composition of the various brands, their action and that of their components on trees, and the effect of emulsification, are dealt with at length. The composition of 17 different commercial brands was found to differ widely, especially in water and phenol contents. Applications of the chief components to apple, pear and plum trees in spring showed that phenols and organic bases are very injurious and that naphthaline and anthracenes are only slightly so. Of the phenols, the cresols, especially "m-Kresol", were the most harmful. The healing of wounds in the trees was quite unfavourably influenced by phenols and organic bases, less so by anthracenes and naphthaline ; in some cases the last-named even proved beneficial. An increase in the phenol content of three readily emulsifiable fruit-tree carbolineums causes a corresponding increase of injury. Besides the chemical composition of the fruit-tree carbolineum its capacity for emulsification

and for remaining in a state of emulsion are of decisive importance. The preparations examined differed widely in this respect, most of them being unsatisfactory. An examination of the phenomena of breaking down of the emulsion showed that aqueous emulsions may yield a product of a totally different composition, with, for instance, a marked increase of the phenol content as compared with that in the initial material. A preparation that is originally non-injurious may thus become very dangerous as a result of the instability of its emulsion.

HASE (A.). **Weitere Versuche zur Frage der biologischen Bekämpfung von Mehlmotten mit Hilfe von Schlupfwespen.** [Further Experiments on the Question of the Biological Control of the Meal Moths with Hymenopterous Parasites.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 2, pp. 163–169. Berlin, August 1925. [Received 10th October 1925.]

In previous experiments [*R.A.E.*, A, xi, 435] on the biological control of *Ephestia kühniella*, Zell., by a Braconid, the latter was erroneously named *Habrobracon brevicornis*, Wesm., its correct name being *H. juglandis*, Ashm. In a further series of experiments the results of the earlier ones were confirmed, and 50–60 per cent. of the larvae of *E. kühniella* were destroyed by the parasite.

HASE (A.). **Beiträge zur Lebensgeschichte der Schlupfwespe** *Trichogramma evanescens* **Westw.** [Contributions to the Life-history of the Hymenopterous Parasite, *T. evanescens*.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 2, pp. 171–224, 9 figs. Berlin, August 1925. [Received 10th October 1925.]

Practical details on the method of breeding the Chalcid egg-parasite, *Trichogramma evanescens*, Westw., are given. It can be bred throughout the year in eggs of *Cimex lectularius*, L., *Ephestia kühniella*, Zell., and *Galleria mellonella*, L. The recorded hosts number 65, including the following important pests: *Euxoa* (*Agrotis*) *segetum*, Schiff., *Cydia* (*Carpocapsa*) *pomonella*, L., *Cheimatobia brumata*, L., *Clysia ambiguella*, Hb., *Dendrolimus pini*, L., *Nygmia phaeorrhoea*, Don. (*Euproctis chrysorrhoea*, L.), *Hybernia defoliaria*, Cl., *Lymantria* (*Liparis*) *monacha*, L., *Malacosoma neustria*, L., *Barathra* (*Mamestra*) *brassicae*, L., *Sparganothis* (*Oenophthira*) *pilleriana*, Schiff., *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., *Pieris brassicae*, L., *P. napi*, L., and *P. rapae*, L. When eight different host-eggs were present simultaneously no preference for any one was observed, and parasites bred from one species readily attack the eggs of all others.

Both sexes occur, and the males may be either alate or apterous. The adults feed and prefer sweet substances, fairly large amounts of water being also needed. Experimentally, with an abundance of food and at room temperature, the adults lived for 30 days. Mating follows immediately after emergence, and may be repeated several times.

This detailed paper includes a bibliography of 94 references.

Hintzelmann (U.). **Beiträge zur Morphologie von** *Trichogramma evanescens* **Westw.** [Contributions to the Morphology of *T. evanescens*.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xiv, no. 2, pp. 225–230, 9 figs. Berlin, August 1925. [Received 10th October 1925.]

The title of this paper indicates its contents, only the adult stage being dealt with.

Riehm (E.). **Prüfung von Pflanzenschutzmitteln im Jahre 1923.** [An Examination in 1923 of Preparations for protecting Plants.]—*Mitt. Biol. Reichsanst. Land- u. Forstw.*, no. 26, 88 pp. Berlin, July 1925. [Received 10th October 1925.]

This paper follows the lines of a preceding one [*R.A.E.*, A, xii, 25], summarising reports on insecticides and fungicides in 1923.

Wilke (S.). **Die diesjährigen Schäden im Obstbau.** [This Year's Losses in Fruit Crops.]—*Nachrichtenbl. deutschen Pflanzenschutzdienst*, v, no. 10, pp. 79–81, 1 map. Berlin, October 1925.

The fruit crops in many parts of Germany suffered heavy losses in 1925, chiefly owing to the action of insect pests—especially the Lepidoptera, *Cheimatobia brumata*, L., *Malacosoma neustria*, L., *Porthetria dispar*, L., *Hyponomeuta malinellus*, Zell., and *Cydia pomonella*, L. Others were *Anthonomus pomorum*, L. (apple blossom weevil), *Psylla mali*, Schm., and *Hoplocampa fulvicornis*, Pz. (plum sawfly).

Börner (—). **Die Reblaus und ihre Bekämpfung.** [The Vine Louse and its Control.]—*Biol. Reichsanst. Land- u. Forstw.*, Flugbl. 34, new edn., 8 pp., 4 figs. Berlin, August 1925. [Received 10th October 1925.]

This brief account of *Phylloxera vastatrix*, Planch., deals with its introduction into and spread in Europe, the harm done by it, its life-history, and the degree of immunity from or resistance to it shown by different varieties of the grape-vine.

Thomsen (M.). **Sex-determination in** *Trialeurodes vaporariorum*—*Nature*, cxvi, no. 2916, p. 428. London, 19th September 1925.

Observations made in America in 1903 showed *Trialeurodes vaporariorum* to be parthenogenetic, all unfertilised eggs developing into males, whereas workers in England found that unfertilised eggs laid by virgin females exclusively gave rise to females. These investigations indicate that this Aleurodid has two races, an American one exhibiting arrhenotokous parthenogenesis, and an English one thelytokous parthenogenesis. The author has found both races in greenhouses in Denmark. His experiments are briefly reviewed and show that the English race is exclusively, or almost exclusively, female-producing. A more detailed account of these observations is to be published later.

Murphy (P. A.) & McKay (R.). **Investigations on the Leaf-roll and Mosaic Diseases of the Potato.**—[*Ireland*] *Dept. Lands & Agric. Jl.*, xxv, no. 2, pp. 138–154, 5 figs. Dublin, August 1925.

Investigations on the leaf-roll and mosaic diseases of potatoes [*R.A.E.*, A, xii, 193] were continued during 1924 and 1925. The Aphids used were *Myzus persicae*, *M. pseudosolani* and *Macrosiphum solanifolii*. Though all have carried each infection at times, the results are not uniform and are sometimes even conflicting. The failure, however, of Aphids on occasion to carry infection from sprout to sprout is not due to the absence of virus in the source of disease, so far at least as leaf-roll is concerned.

Further and convincing proof has been obtained that leaf-roll is occasionally conveyed by the true seed, and apparently this also holds good for diseases of the mosaic group.

Whitehead (T.). **Some Experiments on Potato Leaf-roll Transmission in Wales.**—*Welsh Jl. Agric.*, i, no. 1, pp. 184–188. Cardiff, January 1925. [Received 14th October 1925.]

The value of Scotch seed potatoes apparently depends on the fact that Aphids attacking potatoes are either absent or appear later in the season in the good seed-potato growing districts, so that very little transmission of the virus diseases occurs.

Experiments have been made in different localities in Wales for the production of seed potatoes free from leaf-roll, and the results appear to be of sufficient importance to justify further trials in other centres in 1925. The centres may be divided into two groups, those with relatively little spread of leaf-roll, and those in which the spread of the disease is considerable. Aphids were more abundant in the latter, where conditions were more favourable for their production in large numbers owing to the greater amount of shelter afforded.

Fryer (J. C. F.). **The Insect Enemies of Farm Crops.**—*Welsh Jl. Agric.*, i, no. 1, pp. 190–194. Cardiff, January 1925. [Received 14th October 1925.]

A brief account is given of various measures such as crop rotation, cultivation, etc., by which the depredations of many insect pests may be reduced, particularly on farms, where the conditions or type of crops are not suitable for the application of sprays or the use of special apparatus.

Parker (T.). **The Control of Red Spider.**—*Hortic. Trade Jl.*, xxix, no. 39, pp. 27–28 & no. 40, pp. 27–28, 1 fig. Burnley, 30th September & 7th October 1925.

As the broadcasting method of naphthalene fumigation of green houses for red spider [*Tetranychus telarius*, L.] [*R.A.E.*, A, xii, 430; xiii, 371–372] has not proved entirely satisfactory with plants other than cucumbers, a large number of experiments were carried out in volatilising naphthalene by means of lamps. The great advantage of this method is that the conditions under which the fumigation is performed can be regulated far better than by any other method; also the use of lamps obviates the possibility of injury to exposed

roots by contact with naphthalene. The lamps used, after various trials, were oil lamps holding about 3 pints of paraffin, which is sufficient to burn continuously for 36 hours; over the lamps was fixed a metal funnel in the shape of an inverted cone, on the top of which was placed an aluminium pan for the naphthalene, the object being to minimise wastage of heat. The lamps were placed at intervals along the centre of the greenhouses.

Preliminary experiments showed that for cucumbers it is necessary to vapourise the naphthalene more slowly than for tomatos, thereby lengthening the time of fumigation. Young tomato seedlings were unable to withstand heavy doses of naphthalene, although tomato flowers were unaffected. In most of the subsequent experiments 13 oz. naphthalene per 1,000 cu. ft. was the concentration used, one lamp being sufficient to fumigate 6,000 cu. ft., with 5–5½ lb. naphthalene (16 grade); 90–95 per cent. of the mites were killed at this concentration. The plants must be well watered before fumigation, after which the greenhouse should be closed for about an hour to obtain an atmospheric humidity of 90–95 per cent. Fumigation should start about 4 p.m., and last at least 12 hours. The temperature in the greenhouse should not fall below 70° F., or rise above 105° F.; low night temperatures cause stratification of the vapour, which, forming pockets of high concentration, is likely to cause scorching. The houses should be thoroughly ventilated immediately after fumigation. When the infestation is severe, special caution should be exercised, as the lowered vitality of the plants makes them less able to withstand the fumes. As the eggs are more difficult to kill than the adults, three fumigations at intervals of a week are advisable and are less likely to harm the plants than one at a very high concentration.

The conditions best suited for tomatos, cucumbers, vines and carnations are tabulated to serve as a guide in fumigating them in various types of greenhouses.

MUNRO (J. W.). **Note on the Felted Beech Coccus.**—*Qtrly. Jl. Forestry*, xix, no. 4, pp. 283–289. London, October 1925.

The economic importance of the felted beech coccus (*Cryptococcus fagi*, Bärensp.) is considered to have been greatly over-estimated. The chief, if not the only, causes of the dying of beech trees, which has been attributed to the presence of the Coccid, are thought to be drought and parasitic fungi.

ROEBUCK (A.). **The Use of Poultry against Farm Pests.**—*Eggs*, xi, nos. 12, 13, 25, pp. 206–207, 210–212, 418–419; xii, nos. 1 & 3, pp. 4–5 & 37, 3 figs. Rudgwick, Sussex, March-July 1925.

The value of fowls as destroyers of insect and other pests on arable and grass land and on mustard and willows is pointed out. Birds of various breeds and ages were used in the tests described. Living individuals of the pest under trial were offered to the birds in various ways and at different times. When repeated tests had shown that fowls would eat readily a particular pest, observations were made to see if they were able to search for it in the field, how they got it, in what stage, and what time of year.

Though wireworms are always eaten first by fowls if given to them amongst various other larvae, they are usually not found by these birds in the field, as they are too deep in the soil. Poultry are, therefore, only of use for this purpose on arable land while ploughing, discing or cultivating is in actual progress. For the destruction of the adults it is advisable to keep fowls during May to July on grass land adjoining arable land, and where possible they should be allowed to range over other fields, especially clover, during the early part of May. Leather-jackets, of which *Tipula paludosa* and *Pachyrrhina maculosa* are the most important, are best combated by fowls running on the arable land during the various cultivation operations, though large numbers may also be destroyed by poultry during the winter months, November to February, when the larvae crawl over the surface of the soil. Cut-worms, the commonest of which are *Feltia* (*Agrotis*) *exclamationis* (heart and dart moth) and *Euxoa* (*A.*) *segetum* (turnip moth), are eaten by fowls during cultural operations, and a large number are also reached by scratching. The pupae are readily eaten when turned up with the soil about the end of May and June.

Phaedon cochleariae (mustard beetle) is best controlled by fowls in its winter shelters, such as stacks of mustard or stubble in the field. The adults of *Phyllodecta vulgatissima* (blue willow beetle) are readily eaten by fowls, and would no doubt be eradicated, if these birds could be on the land all the year round. This is not possible, as for part of the winter the osier beds are under water ; if, however, the birds were put on the land from April to June, to the number of about 200 per acre, the pest would be well controlled.

Various caterpillars, such as those of *Pieris brassicae*, *P. rapae*, *P. napi*, and *Barathra* (*Mamestra*) *brassicae* on cabbages, are also eaten by fowls, but their use against these pests is more limited, chiefly owing to the damage done to the crops concerned by the fowls themselves. The root-feeding larvae of *Hepialus humuli* and *H. lupulinus*, however, are often found in fields and grassland. They are readily eaten by fowls when exposed by tillage operations from August and May, as are the pupae in June.

HOARE (A. H.). **A Grower's Power Spraying Outfit.**—*Jl. Minist. Agric.*, xxxii, no. 8, pp. 730–731, 1 fig. London, November 1925.

A portable power spraying plant is described, which, besides dealing with the spraying of a large acreage of fruit, can be of service in the routine operations of a mixed farm.

The 4-h.p. engine is the chief improvement, as it is capable of operating a saw-bench, chaff-cutter and other machinery, so that the outfit may be profitably employed throughout the year.

BUCKHURST (A. S.). **Notes upon Bulb Mites and Eelworms.**—*Jl. Minist. Agric.*, xxxii, no. 8, pp. 734–738. London, November 1925.

A large number of imported bulbs are found on arrival in England to be destroyed, apparently owing to infestation by *Rhizoglyphus echinopus*. As it has been suggested that the mites are probably unable to destroy a bulb that is otherwise in a healthy condition, experiments on this point were made during 1924. A certain number of bulbs were planted out, some of which were deliberately infested

with mites. With one exception they all produced normal blooms, and the experiments indicate, at least in the case of *Narcissus*, that *R. echinopus* is not a primary pest. In the case of hyacinths the numbers used were not sufficient to warrant definite conclusions, but suggest that the mite can do little direct harm.

Experiments to determine whether the potato races of *Heterodera schachtii* (beet eelworm) and *Tylenchus dipsaci* (common stem eelworm) are able to attack other crops are still in progress. They have not been extensive enough to justify definite conclusions, but suggest that *T. dipsaci* is a primary pest of potato, and not as seemed possible a secondary one that enters the tuber only if it has been injured or attacked by some other organism. The potato race of this Nematode cannot apparently subsist on oats, though they are susceptible to attack by individuals of another race. The potato race of *H. schachtii* also failed to attack various other crops offered to it. If these experiments are further confirmed, it would appear that there are several crops that could be safely planted on land infested with the potato race of Nematodes and so starve them out.

Pierre (C.). **Faune de France. 8. Diptères : Tipulidae.**—8vo. 159 pp., 600 figs. Paris, P. Lechevalier, 1924. Price, *Frs.* 15.

In this monograph a general account is given of Tipulids and their parasites. The author's classification of the family is fully explained by the use of keys. An extensive bibliography is included.

Gautier (—), Bonnamour (—) & Chifflot (—). **L'évolution du *Tingis pyri*.**—*Bull. bi-mens. Soc. linn. Lyon*, ii, no. 2–3, pp. 14–15. Lyons, January–February 1923. [Received 5th September 1925.]

Stephanitis (*Tingis*) *pyri*, which does considerable damage to pear and apple trees in the neighbourhood of Lyons, lays its eggs at the beginning of spring on the lower surface of the leaves. The eggs hatch after 17 days, and the larvae at once begin to suck the juice from the leaves. The insect becomes adult after five moults, which take place every 3–5 days.

Varrichon (—). **Dégâts causés par des insectes aux chambres de plomb, dans les usines productrices d'acide sulfurique.**—*Bull. bi-mens. Soc. linn. Lyon*, iv, no. 1, pp. 5–6. Lyons, 9th January 1925.

Serious damage to leaden vats in sulphuric acid factories caused by larvae, possibly of a species of *Cossus*, is recorded from the neighbourhood of Lyons.

Bonnamour (S.). *Parmena fasciata* **Vill. et ses dégâts sur les groseilliers.**—*Bull. bi-mens. Soc. linn. Lyon*, iv, no. 6, pp. 47–48. Lyons, 20th March 1925.

The larva of the Lamiid, *Parmena balteus*, L. (*fasciata*, Vill.), is recorded near Lyons destroying currant and gooseberry bushes by hollowing out the twigs. It shows a preference for old or diseased twigs, but also attacks healthy ones.

RAVAZ (L.). **L'Eudémis et la Cochylis.**—*Prog. agric. & vitic.*, lxxxiv, no. 42, pp. 365–369, illus. Montpellier, 18th October 1925.

The resistance of certain varieties of grape-vine to the attacks of the vine moths [*Clysia ambiguella*, Hb. and *Polychrosis botrana*, Schiff.] is discussed, and suitable apparatus for the usual winter treatments are described and illustrated.

COTTE (J.). **Un ravageur de la Violette :** *Brotolomia meticulosa*, **L.**—*Rev. Path. vég. & Ent. agric.*, xii, no. 2, pp. 117–118. Paris, May–June 1925.

Violets in the French Riviera have been badly injured by attacks of the Noctuid, *Brotolomia meticulosa*, L. In northern Europe this moth has only one generation in a year, and in most of its other habitats two, but in Hyères the long period of vegetation and the favourable climate render possible the appearance of a third generation. It is hoped that crushing the larvae and the other remedial measures that are being employed, together with the efforts of natural enemies, will very greatly reduce the infestation.

R. Poutiers, commenting on this paper, states that in the district of Mentone this species shows a decided preference for potatoes in storage, which it infests throughout the year.

FAURE (Jean C.) & ZOLOTAREWSKY (B.). **Contribution a l'étude biologique de** *Dibrachys boucheanus*, **Ratz.**—*Rev. Path. vég. & Ent. agric.*, xii, no. 2, pp. 144–161. Paris, May–June 1925.

The Pteromalid, *Dibrachys boucheanus*, Ratz., is widespread and polyphagous. It is frequently confused with *D. affinis*, Masi, which, however, is an internal parasite, while *D. boucheanus* is an external one. The chief differences between the two species are enumerated.

A list is given of the known hosts of *D. boucheanus*, including 2 Coleoptera, 2 Diptera and 41 Hymenoptera. The authors have made a particular study of its importance as a parasite of the vine moth, *Polychrosis botrana*, Schiff., and of *Apanteles glomeratus*, L., a parasite of *Pieris brassicae*, L. They have proved that it is a direct parasite of the larvae of *P. botrana* within their cocoons, and is occasionally found in the larval stage on the pupae of this host ; it is also parasitic on the larvae of Hymenopterous parasites in the pupa of *P. botrana*. Many of the eggs deposited by *D. boucheanus* on the larvae of *P. botrana* fail to survive, owing to the premature drying up of the host larva or to its death from the attacks of fungi.

The method of direct feeding by the adult parasite on the larva of *P. botrana* in the cocoon is described ; when the host larva is not easily accessible within the cocoon, as in the case of *A. glomeratus*, feeding occurs by means of a suction tube, such as has frequently been described with this type of parasite. In view of the fact that *D. boucheanus* not only feeds on the larvae of *P. botrana*, but also attacks and can complete development on its primary parasites, it cannot be considered at present an important auxiliary in the control of the vine moth, though its influence on the summer generations must be further studied. With regard to *Pieris brassicae*, its rôle is distinctly an injurious one owing to the severity of its attacks on *A. glomeratus*.

The introduction of this parasite into a new country would therefore require careful consideration, and as regards France, its rôle would seem to be on the whole more injurious than beneficial.

CAVADAS (D. S.). **La situation phytopathologique au Pélion (Grèce).**—*Rev. Path. vég. & Ent. agric.*, xii, no. 2, pp. 164–179, 2 figs. Paris, May–June 1925.

It is only during recent years that Mount Pelion, in Greece, has become an important olive-growing centre, owing to the success against *Dacus oleae* obtained by means of sodium arsenite sprays [*R.A.E.*, A, x, 3]. In 1924, nearly 3,000,000 trees were sprayed, of which those situated as high as 700 ft. above sea-level received only one application, while the lower-growing ones had four. The result of this treatment was that infestation did not reach a higher figure than ½ per 1,000. The first application should be general, so as to leave no part open to infestation by the first generation of the fly; the following ones will give complete protection even if only applied to the centres of infestation of the fly. The dates of the last three sprays depend upon the humidity at the time and the date of the first treatment, which, on Pelion, should begin from 10th June.

REBOUILLON (—). **Sur la sélection macroscopique et microscopique des papillons de vers à soie du mûrier** (*Sericaria mori*) **atteints de la maladie de la "grasserie."**—*C.R. Acad. Agric. France*, xi, no. 27, pp. 744–748. Paris, 1925.

From a study of the polyhedral granules associated with the disease known as "grasserie" in the silkworm, *Bombyx* (*Sericaria*) *mori*, the author hopes to be able to establish a system of selection of healthy silkworms from a macroscopic examination of individuals in the course of transformation to the adult stage, and of elimination, with the aid of a microscope, of reproducing individuals showing polyhedral granules. This selection should be as simple as that at present practised against pebrine disease, and could be done at the same time, with the same preparation, but must include both sexes, as the exact rôle of the reproducing adult in the transmission of the virus has not yet been determined.

TROUVELOT (B.). **Directives à suivre dans l'importation pour les besoins de l'agriculture, d'Insectes entomophages étrangers.**—*Rev. Zool. agric. & appl.*, xxiv, nos. 6 & 7, pp. 125–148, 3 pls., 10 figs. Bordeaux, June & July 1925.

This paper was read at the Conference of Directors from various stations of the Institute of Agronomic Research held at Paris on 22nd April 1925. The utilisation of parasites for the biological control of insect pests presents two distinct problems, namely, the importation of fresh species and the judicious use of existing ones, whether native or introduced. The second of these (the more difficult of the two) has been somewhat neglected. A list is given of the principal introductions of foreign parasites into various countries. One outstanding discovery resulting from the study of these introductions is the importance of introducing a certain number of parasites with different biological characteristics, but without overstepping a certain limit.

The factors that maintain equilibrium among native pests are generally found to comprise a whole group of parasites, or rather two groups, consisting of a number of very active species and others that are weak or insignificant in their action, or that are even, broadly speaking, more harmful than beneficial. There are two influences operating against successful parasitism, namely, hyperparasitism and co-parasitism, and it may often happen that an imported parasite may cause great destruction among existing native ones. This is particularly the case with certain Hymenoptera that have many varied hosts. Co-parasitism is a study of more recent date. When importations were made into Hawaii of parasites of *Ceratitis capitata*, three successive species were acclimatised, raising the percentage of parasitism as high as 90; the introduction of a fourth species, however, reduced this percentage to 75 or 80. It follows that in the choice of parasites to be introduced, consideration must be given not only to the estimate of activity of the species in its native country, but also to the effect that fresh environment is likely to have upon it in the matter of climate, distribution of both wild and cultivated plants, composition and dissemination of the fauna, cultural methods in practice, and the method of development, distribution and susceptibility of the host species. In this connection the author discusses briefly the facilities for maintenance of parasites, the synchronism of the cycle of development between the parasite and host, parasitic activity, possibilities of superparasitism and of co-parasitism, tendencies to hyperparasitism, variations in activity due to climate, possibilities of hybridisation with allied species native to the importing country, and the power of dispersion of the parasite compared with that of its host.

POUTIERS (R.). **Traitements contre le pou rouge** (*Chrysomphalus dictyospermi*) **et autres cochenilles à carapace.**—*Rev. Zool. agric. & appl.*, xxiv, no. 7, pp. 154–157. Bordeaux, July 1925.

The author discusses the preparation of an oil emulsion that has previously been dealt with at greater length [*R.A.E.*, A, xiii, 296].

JUILLET (A.). **Culture et emploi du pyrèthre.**—*Terre vaudoise*, xvii, nos. 38 & 39, pp. 557–558 & 570–571. Lausanne, 19th & 26th September 1925.

While in the past some 120 tons of pyrethrum insecticide have been imported annually into France, it is hoped that before long this will be entirely superseded by material grown and prepared on the spot. Statistics are given showing the profit that may be made by this industry, with an account of the methods of cultivation of the plant and preparation of the insecticide, and of its use against the vine moths [*Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff.] [*R.A.E.*, A, x, 209, 231; xii, 10, 479, etc.].

PAILLOT (A.) & FAURE (Jean C.). **Utilisation sur place de la récolte de pyrèthre.**—*Bull. agric. Alg.-Tun.-Maroc.*, xxxi, no. 9, pp. 196–197. Algiers, September 1925.

This paper has been noticed from another source [*R.A.E.*, A, xiii, 529]. It is a slightly more detailed account of the preparation of pyrethrum as an insecticide than one previously noticed [*R.A.E.*, A, xii, 10].

Willaume (F.). **Utilisation des propriétés insecticides du Derris.**—*Rev. Hist. nat. appl.* (1), vi, no. 9, pp. 285–288. Paris, September 1925.

The possibility of cultivating *Derris elliptica* and *D. uliginosa* in French West Africa for insecticidal uses is contemplated. It is thought that these plants would readily become acclimatised and prove of considerable value, in particular against the vermin with which the natives are frequently infested, and for protection of the cotton crops against their numerous pests. The botanical characters and insecticidal properties of the plants are discussed, and methods of preparation of both powder and liquid are quoted from other authors. The use of derris is of too recent date for complete certainty of its success in all cases, and it is feared that its action on man may be dangerous, since it is known to have been used by natives to poison their arrows and is also poisonous to monkeys when ingested.

Maheu (J.). **Tuba Parasiticides.**—*Pharm. Jl. & Pharmacist,* cxv, no. 3225, pp. 207–208. London, 8th August 1925.

The chief plants that are definitely known to have marked insecticidal properties are *Chrysanthemum cinerariaefolium, C. coccineum, C. marshalli, Derris elliptica, D. uliginosa,* and "cube," a Peruvian plant.

The two species of *Derris*, and also some species of the nearly allied genus *Pongamia*, are used in Sumatra to kill caterpillars on tobacco plants, the resin, soluble in chloroform, from the stems and rhizomes being the active principle. It acts upon insects either as a stomach or contact poison.

de Seabra (A. F.) & dos Santos Hall (F. A.). **Contributions pour l'histoire naturelle des " Tortrix " du chêne-vert à l'Alentejo.**—*Mem. Estud. Mus. Zool. Univ. Coimbra,* ser. ii, no. 1, pp. 11–45, 7 pls. Coimbra, 1924. [Received 10th October 1925.]

The eggs of *Tortrix viridana* are laid on the young branches of the evergreen oak, *Quercus ilex*, two or three days after the emergence of the adult, which takes place in Portugal during May. The larval stage lasts 17–18 days. The larvae at first feed inside the buds, but later attack the young leaves, which they roll together, pupating in them.

In northern Europe deciduous oaks are attacked, while evergreen oaks are almost immune.

The most effective measure is to cut off all the one and two year old branches after the eggs have been deposited on them.

A list of the numerous parasites of *T. viridana* is given.

Kéler (S.). **Ein Versuch der Anwendung mathematisch-statistischer Methoden auf die entomologische Systematik mit Beschreibung einer neuen Borkenkäferart** *Ips fejferi* **n. sp. und Bemerkungen über** *Ips erosus* **Woll.** [An Attempt to apply mathematical and statistical Methods in Systematic Entomology with a Description of a New Bark-beetle *I. fejferi* and Remarks on *I. erosus*.]—*Polskie Pismo ent.*, iv, pt. 3, pp. 149–196, 4 pls., 2 figs., numerous tables. Lemberg, 1925.

The author urges the adoption of Szymkiewicz' method of biometric, statistical measurements for the description of insects. He is of

opinion that many existing descriptions of varieties are based on inadequate differences, which are not necessarily constant. The application of this method to bark-beetles is discussed, using *Ips erosus*, Woll., of which *I. proximus*, Eichh., is considered a synonym, as an example of the many variations that may occur in individuals belonging to the same species.

I. fejferi, sp. n., is described from Poland, where it was found under the bark of *Pinus silvestris*.

Karpinski (J. J.). **Wykaz kornikόw okolic Częstochowy.** [A List of Bark-beetles from the Environs of Czestochowa.]—*Polskie Pismo ent.*, iv, pt. 3, pp. 215–218. Lemberg, 1925. (With a Summary in German.)

The bark-beetles recorded are: From birch, *Scolytus ratzeburgi*, Jans., *Xyloterus signatus*, F., and *Xyleborus* (*Anisandrus*) *dispar*, F.; from alder, *Xyloterus domesticus*, L.; from hornbeam [*Carpinus*], *S. carpini*, Ratz., and *S. pygmaeus*, F.; from aspen [*Populus tremula*], *Cryphalus* (*Trypophloeus*) *asperatus*, Gyll., *Xyleborus* (*Heteroborips*) *cryptographus*, Ratz., *X. xylographus*, Say (*Xyleborinus saxeseni*, Ratz.); from oak, *S. intricatus*, Ratz., and *X. xylographus*; from ash, *Hylesinus* (*Leperisinus*) *fraxini*, Panz.; from elm, *S. multistriatus*, Mrsh., and *S. pygmaeus*; from apple, *S. mali*, Bechst.; from plum, *S. rugulosus*, Ratz.; from pine, *Myelophilus piniperda*, L., *M. minor*, Hart., *Hylurgus ligniperda*, F., *Hylurgops palliatus*, Gyll., *Hylastes ater*, Payk., *H. attenuatus*, Er., *H. opacus*, Er., *H. angustatus*, Hrbst., *Crypturgus cinereus*, Hrbst., *Xyloterus lineatus*, Oliv., *Pityophthorus micrographus*, L., *Pityogenes bidentatus*, Hrbst., *P. quadridens*, Hart., *Ips sexdentatus*, Boern., *I. duplicatus*, Sahlb., *I.* (*Orthotomicus*) *proximus*, Eichh., *I.* (*O.*) *laricis*, F., and *I.* (*O.*) *suturalis*, Gyll.; from larch, *M. piniperda*, *H. attenuatus* and *H. opacus*; from fir, *Pityophthorus micrographus*, *Ips* (*Pityokteines*) *curvidens*, Germ., *I.* (*P.*) *vorontzowi*, Jakobs. (on thin branches), and *I.* (*P.*) *spinidens*, Reitt. (on upper parts of trunks); and from spruce, *Dendroctonus micans* Kug. (80–100 year old trees), *Hylurgops palliatus*, *Hylastes angustatus*, *Polygraphus poligraphus*, L., *Crypturgus pusillus*, Gyll., *C. cinereus*, *Cryphalus piceae*, Ratz., *Xyloterus lineatus*, *Dryocoetes autographus*, Ratz., *Pityophthorus micrographus*, *Pityogenes chalcographus*, *I. typographus*, L., *I. duplicatus*, *I. laricis* and *I. suturalis*.

[Bekman (Yu. I.).] **Бекман (Ю. И.). Об опасности завоза жуков-зерновок.** [On the Danger of the Introduction of Bruchids.]—*Ann. State Inst. Exptl. Agron.*, iii, no. 2–4, pp. 136–137. Leningrad, 1925.

Attention is drawn to the danger of importing Bruchids in various crops into Russia. During December 1924, eleven different species were found alive among seeds imported from different countries, which included *Bruchus* (*Pachymerus*) *chinensis* in lentils and *B. obtectus* (*Bruchidius obsoletus*). The latter has apparently already become established in the Crimea in bean crops.

[Filipev (I. N.).] **Филипьев (И. Н.). Саранчевые в С.С.С.Р. в 1921-24гг.** [Locusts in U.S.S.R. in 1921–24.]—*Ann. State Inst. Exptl. Agron.*, iii, no. 2–4, pp. 151–154. Leningrad, 1925.

A brief summary of data is given on the appearance of locusts and grasshoppers in European and Asiatic Russia during 1921–24. The area attacked by these pests has increased since 1921.

The Asiatic locust (*Locusta migratoria*, L.) appeared in masses in the usual breeding-places in south and central Russia [*R.A.E.*, A, xiii, 543].

The Moroccan locust (*Dociostaurus maroccanus*, Thunb.) caused severe injury in Transcaucasia, but the organisation for its control was very successful. The same species appeared in small numbers in the Crimea and in the Northern Caucasus.

The Italian locust (*Calliptamus italicus*, L.) was most numerous in 1923, when the whole of south European Russia was infested, and swarms also appeared in isolated places in Turkestan.

The Siberian grasshopper (*Gomphocerus sibiricus*, L.), sometimes accompanied by others, such as *Stauroderus scalaris*, F.W., *Chorthippus albomarginatus*, DeG., *Stauroderus apricarius*, L., *Arcyptera microptera*, F.W., and *Dociostaurus crucigerus brevicollis*, Ev., also appeared during the period in considerable numbers and did serious damage locally, both in Asiatic and eastern European Russia.

Brief ecological remarks are given on each species.

[Filipev (I. N.).] **Филипьев (И. Н.). Свекловичная нематода и опасность ее дальнейшего заноса в С.С.С.Р.** [The Beet Nematode and the Danger of its further Introduction into U.S.S.R.]—*Ann. State Inst. Exptl. Agron.*, iii, no. 2–4, pp. 154–155. Leningrad, 1925.

This is a résumé of a report read at the Quarantine Section of the 5th All-Russian Entomo-Phytopathological Meeting. The distribution of *Heterodera schachtii*, Schmidt, in Europe, and the various methods by which it may be introduced into fresh localities are outlined. In order to prevent its further spread in Russia, it is suggested that the importation from Germany or the transportation from infested areas in Russia of sugar-beet seedlings and seed should be prohibited.

[Uvarov (B. P.).] **Уваров (Б. П.). Вредители хлопчатника в Египте, Индии и Месопотамии.** [Cotton Pests in Egypt, India and Mesopotamia.]—**Хлопковое Дело** [*Cotton Industry*], iii, no. 9-10, pp. 63–77. Moscow, September–October 1924. [Received 3rd November 1925.]

The insect pests of cotton occurring in Egypt, India and Mesopotamia are reviewed. The Russian cotton fields are comparatively free from any serious pests, and the importance of maintaining these conditions is emphasised.

[Nikolski (V. V.).] **Никольский (В. В.). Новый метод борьбы с саранчевыми насекомыми.** [A New Method of Locust Control.]—**Хлопковое Дело** [*Cotton Industry*], iii, no. 9–10, pp. 77–88. Moscow, September–October 1924. [Received 3rd November 1925.]

South African experiments in the use of sodium arsenite dusts against locusts [*R.A.E.*, A, xi, 251] are described, and the advantages of this method are discussed.

Mostauskis (S.). **Dotnavos Zemes Ukio Technikumo Entomologijos Kabineto darbai 1921–1922 m.** [Entomological Report for 1921–1922.]—pp. 219–240, 1 fig. Dotnava, 1923. [Received 6th November 1925.]

This Report from Dotnava is in Lithuanian. The more important insect pests dealt with are *Ips* (*Tomicus*) *typographus*, L., *Pityogenes chalcographus*, L., *Polygraphus poligraphus*, L., *Hylesinus fraxini*, F., *Scolytus* (*Eccoptogaster*) *intricatus*, Panz., *S. scolytus*, F., *Hylastes palliatus*, Gyll., *Xyloterus lineatus*, Oliv., *Diprion* (*Lophyrus*) *rufus*, Kl., *Xylotrechus* (*Clytus*) *rusticus*, L., *Lymantria* (*Ocneria*) *monacha*, L., *Hyponomeuta euonymellus*, L., *H. malinellus*, Zell., *Tetraneura ulmi*, DeG., *Phylloxera coccinea*, Heyd., *Phytometra* (*Plusia*) *gamma*, L., *Euxoa* (*Agrotis*) *segetum*, Schiff., *Anthonomus pomorum*, L., *Rhynchites aequatus*, L., *Cydia* (*Carpocapsa*) *pomonella*, L., *Pieris brassicae*, L., and *Tenebrio molitor*, L.

[Ilchev (D.).] **Илчевъ (Д.). Приносъ къмъ изучване биологията на вредниятъ скакалецъ** *Caloptenus italicus* **L.** [A Contribution to the Biology of the injurious Locust, *Calliptamus italicus*, L.]—*Mitt. bulgar. ent. Ges.*, ii, pp. 54–55. Sofia, 1925.

The development of *Calliptamus* (*Caloptenus*) *italicus*, L., under laboratory conditions is briefly described. The total life-cycle from the hatching of the eggs to the appearance of the adults lasted from 27th May to 17th August at temperatures of 20–30° C. [68–86° F.]. The eggs are inserted in the ground, the winter being passed in this stage.

[Ioakimov (D.).] **Йоакимовъ (Д.). Смъзтоносно нападение на лозата отъ дървесиноядното бръмбарче** *Anisandrus* (*Xyleborus*) *dispar*, **F.** [Injury to Vines by the Larvae of *X. dispar*, F.]—*Mitt. bulgar. ent. Ges.*, ii, p. 56. Sofia, 1925.

During the summer of 1924 considerable injury was caused in various vineyards in Bulgaria by the larvae of *Xyleborus* (*Anisandrus*) *dispar*, F.

[Tchorbadzhiev (P.)]. **Чорбаджиевъ (П.). Прегледъ на вреднитѣ насекоми въ България презъ 1924 г. и борбата съ тѣхъ.** [A Review of Injurious Insects in Bulgaria in 1924 and their Control.]—*Mitt. bulgar. ent. Ges.*, ii, pp. 57–61. Sofia, 1925.

Calliptamus (*Caloptenus*) *italicus*, L., was fairly abundant, but considerably checked by the activities of a bird (*Pastor roseus*), and a fungus, *Botrytis* sp. Pests of fruit trees included *Aspidiotus ostreaeformis*, Curt., which occurred particularly on plums; *Cydia* (*Carpocapsa*) *pomonella*, L., which was responsible for the loss of over 50 per cent. of the apples; *C.* (*Grapholitha*) *funebrana*, Tr., and *Hoplocampa fulvicornis*, Klug, on plums; *Rhynchites bacchus*, L.; *Hyponomeuta malinellus*, L.; *H. padellus*, L.; *Aporia crataegi*, L.; *Scolytus rugulosus*, Ratz.; *Porthetria* (*Lymantria*) *dispar*, L.; *Lepidosaphes ulmi*, L. (*Mytilaspis pomorum*, Bch.); *Anthonomus pomorum*, L.; *Capnodes tenebrionis*, L.; and *Eriosoma* (*Schizoneura*) *lanigerum*, Hausm. The vine pests recorded were *Euxoa* (*Agrotis*) *tritici*, L., *Polychrosis*

botrana, Schiff., *Eriophyes vitis*, Land., and a Cistelid, *Omophlus lepturoides*, F. (*betulae*, Hbst.). The last was also recorded from cereals, as were *Sitotroga cerealella*, Ol., *Lema melanopa*, L., and *Epicometis hirta*, Poda. *Phytodecta sexpunctata*, Panz., caused considerable injury to lucerne; and *Gryllotalpa gryllotalpa*, L. (*vulgaris*, Latr.), is also recorded as a pest of forage crops.

Other pests were *Thrips tabaci*, Lind., *Agrilus viridis*, L., *Loxostege* (*Phlyctaenodes*) *sticticalis*, L., *Tortrix viridana*, L., *Pissodes notatus*, L., *Myelophilus piniperda*, L., *Pityogenes chalcographus*, L., *Ips typographus*, L., *I. rectangulus*, Eichh., and *Hylesinus fraxini*, Panz.

[Mokrzhetzki (S.).] **Мокржецки (С.).** *Xyletinus* (*Lasioderma*) *serricorne*, **F.—Сигарный жучек въ Болгаріи.** [*L. serricorne*, F., Tobacco Beetle in Bulgaria.]—*Mitt. bulgar. ent. Ges.*, ii, pp. 64–66. Sofia, 1925. (With a Summary in German.)

Lasioderma (*Xyletinus*) *serricorne*, F., causes considerable injury to stored products, especially tobacco, in Bulgaria. The spring flight of the adults occurs in May. The eggs are laid on the leaf tobacco and hatch in about 10 days. The larvae feed on the edges and centre of the leaf, and the adults make holes through the leaves and in cigars. The larval stage lasts from 6 to 7 weeks, and the pupal stage about 2 weeks. The adults are again on the wing in August and September and pass the winter in any suitable crack or crevice. This beetle may also hibernate in the larval stage.

The remedies recommended are fumigation with hydrocyanic acid gas, and the protection of all tobacco products by keeping them in closed boxes or wrapped in paper. The importance of cleanliness and ventilation in storage is pointed out.

[Kuzev (K. T.).] **Кузевъ (К. Т.). Нашитѣ насекомоядни птици.** [Our Insect-eating Birds.]—*Mitt. bulgar. ent. Ges.*, ii, pp. 73–77. Sofia, 1925.

The importance of birds in the destruction of insect pests is discussed, and a list is given of the insectivorous birds occurring in Bulgaria, showing their popular and scientific names, the field of their greatest activities, and whether they are migratory or not.

[Drenski (P.).] **Дрѣнски (П.). Приносъ къмъ биологията на сливовия акаръ** (*Eriophyes phloeocoptes*, **Nal.).** [Notes on the Biology of the Plum Gall-mite *Eriophyes phloeocoptes*, Nal.]—*Mitt. bulgar. ent. Ges.*, ii, pp. 78–83, 4 figs. Sofia, 1925. (With a Summary in German.)

The actual time of attack on the young shoots of plum trees by *Eriophyes phloeocoptes*, Nal., depends on climatic conditions in the spring, but as a rule in Bulgaria all the mites have penetrated the epidermis by the end of May, and later bore further through the inner layers of the bark. This attack causes considerable injury by weakening the shoots, which frequently dry up. The resulting galls are described. During these observations a large number of the mites died and disappeared from the galls, possibly because the growth of the trees was too strong to allow of the development of the mites.

[Tchorbadzhiev (P.).] Tschorbadjiew (P.). **Beitrag zur Erforschung der Parasiten der schädlichenInsekten in Bulgarien.** [Contribution to the Knowledge of Parasites of injurious Insects in Bulgaria.] —*Mitt. bulgar. ent. Ges.*, ii, pp. 84–89. Sofia, 1925.

This list of 13 Tachinids, 17 Chalcids, 11 Braconids and 14 Ichneumonids recorded from Bulgaria includes notes as to seasonal occurrence and hosts.

Urban (C.). **Der Veilchenkäfer.** [The Violet Beetle.]—*Ent. Blätter*, xxi, no. 3, pp. 139–141, 1 fig. Berlin, 30th September 1925.

In Germany a weevil, *Orobitis cyaneus*, L., has been observed attacking violets. Development takes place in the seed-capsules and not in the roots, as stated by Reitter. Reproduction occurs in spring, and the larvae live singly and do not eat all the seeds in the infested capsule. They pupate in the latter, and the young adults begin to appear in July or August, the chief emergence occurring later. Larvae, pupae and adults are all found in September. The infested capsules show scarcely any trace of injury externally, but turn yellow while healthy ones are still green.

v. Lengerken (H.). **Coleoptera III.**—*Biol. Tiere Deutschlands*, Teil 40, pp. 105–168, 49 figs. Berlin, Borntraeger, 20th August 1925.

This is the third part of the section on Coleoptera of a treatise on the biology of the fauna of Germany [*R.A.E.*, A, xiii, 7].

Naumann (A.). **Im Gartenbau schädliche Gallmilben.** [Gall-mites injurious in Horticulture.]—*Die kranke Pflanze*, i, no. 9, pp. 178–179; ii, no. 1–2, pp. 6–9, 1 fig. Dresden, December 1924 and January–February 1925. [Received 20th October 1925.]

The mites dealt with are: *Phyllocoptes azaleae*, Nal., curling the leaves of azaleas; *Eriophyes loewi*, Nal., causing witch's broom growths on *Syringa vulgaris*, and sometimes on *S. chinensis*; *E. vitis*, Nal., causing a felt-like growth on grape-vines; *E. pyri*, Nal., producing pock markings on pear leaves; *E. ribis*, Nal., attacking the buds of currants; and *E. avellanae*, Nal., infesting the buds of hazel.

Baunacke (—). **Ein arger Feind der Stachel- und Johannisbeersträucher.** [A serious Enemy of Gooseberry and Currant Bushes.]—*Die kranke Pflanze*, ii, no. 5, pp. 95–97. Dresden, May 1925. [Received 20th October 1925.]

The gooseberry sawfly, *Pteronus* (*Nematus*) *ribesii*, Scop., is a serious pest of gooseberry and currant in Germany. An effective preventive consists in working the soil beneath the bushes and digging in plenty of quicklime in autumn or early spring. This kills the larvae of the autumn generation hibernating at a depth of 2–4 inches, and if any are able to pupate and give rise to adults, the latter cannot reach the surface. Where this has not been done the larvae must be collected on their first appearance.

After the berries have been picked, spraying or dusting with insecticides should be resorted to. Suitable sprays include a 2 per cent. solution of barium chloride, with the addition of some flour to increase adhesiveness; a 2 per cent. solution of tobacco extract; a 15 per cent. solution of resin soap; or a solution of quassia chips and soft soap.

LANDGRAF (T.). **Der Frostspanner und seine Verbreitungsmöglichkeit.** [The Winter Moth and its Capacity for Spreading.]—*Die kranke Pflanze*, ii, no. 6, pp. 113–116. Dresden, June 1925. [Received 20th October 1925.]

Large outbreaks of insect pests are due to combinations of favourable factors. This has led to an endeavour to predict epidemics by means of rules applied to collected data, but these cannot include all the possible causes. This has been clearly shown in investigations on the winter moth [*Cheimatobia brumata*]. Banding, which is supposed to guard against infestation by this pest, may be rendered nugatory by the bands being bridged by leaves, or by the bodies of the captured insects, or pairing couples may be blown on to banded trees. As a general rule the female oviposits after the trees have lost their leaves, but in some years foliage is present, and the leaf-stems bear many eggs. When these leaves are blown away, they may lead to widespread infestations in banded orchards.

BAUNACKE (—). **Was lehrt uns die Frostspannerplage 1924-25?** [What does the Winter-moth Outbreak of 1924–25 teach us?]—*Die kranke Pflanze*, ii, no. 8, pp. 161–166. Dresden, August 1925. [Received 20th October 1925.]

In discussing the above paper on *Cheimatobia brumata*, L., the author considers that quite satisfactory results are obtained by banding, provided that proper material is used and the bands are applied in good time, following the information given by indicator bands placed on the trees towards the end of September.

BAUNACKE (—). **Eine Getreidelaufkäferplage.** [An Outbreak of *Zabrus tenebrioides*.]—*Die kranke Pflanze*, ii, no. 6, pp. 117–119, 1 fig. Dresden, June 1925. [Received 20th October 1925.]

The Carabid, *Zabrus tenebrioides*, Goeze, has increased in some parts of Saxony, winter wheat being seriously injured. In severe infestations the damaged crop should be ploughed under and replaced by one that is unattractive to the larvae of this beetle, which may be prevented from migrating by means of trenches containing calcium chloride.

BAUNACKE (—). **Die Spargelfliege** (*Platyparea poecilopterа* **Schrk.**). [The Asparagus Fly.]—*Die kranke Pflanze*, ii, no. 6, pp. 122–123, 1 pl. Dresden, June 1925. [Received 20th October 1925.]

The following measures are advocated against the asparagus fly, *Platyparea poecilopterа*, Schr.: Wooden pegs of the size and shape of asparagus heads may be smeared with an adhesive and placed close to the heads in order that the female may settle on them to oviposit,

Heads that are just beginning to emerge may be dusted with naphthaline or wood charcoal. The asparagus stalks may be severed at least 8 inches beneath the surface of the soil and burned so as to destroy any pupae they may contain. The most practical measure, however, consists in removing and burning all shoots showing any trace of injury.

PRELL (H.). **Ein neuer "Waldgärtner" der Lärche.** [A new Bark-beetle infesting Larch.]—*Die kranke Pflanze*, ii, no. 7, pp. 138–141, 2 figs. Dresden, July 1925. [Received 20th October 1925.]

In the summer of 1920 bark-beetles abounded in the spruce forests of Central Bohemia following on defoliation by the nun moth [*Lymantria monacha*, L.]. In 1921, these beetles migrated to larch, when they were found to be, not *Ips amitinus*, Eichh., as previously supposed, but *I. cembrae*, Heer. This beetle usually occurs in dying branches of larch, but it had left its usual food-plant for the spruce woods on the occasion of their defoliation, and had infested the dead and dying trees. When in the next year this opportunity was lacking, it returned in greatly augmented numbers to the larch, of which it then became a serious pest. It mines the bases of the terminal twigs in order to feed, and so weakens them that the wind easily breaks them off. The European and the Japanese larch are equally attacked.

TEMPEL (W.). **Der Rübenaaskäfer** (*Blitophaga opaca*, **L.) und seine Bekämpfung.** [*B. opaca* and its Control.]—*Die kranke Pflanze*, ii, no. 7, pp. 141–143. Dresden, July 1925. [Received 20th October 1925.]

In some parts of Saxony considerable injury to beet is being caused by the larvae and adults of *Blitophaga opaca*, L. Particulars of its biology and control are quoted [*R.A.E.*, A, xi, 435].

TEMPEL (W.). **Der Kieferntriebwickler** (*Evetria buoliana*, **Schiff.).** [The Pine Shoot Moth, *Rhyacionia buoliana*.]—*Die kranke Pflanze*, ii, no. 8, pp. 166–167, 7 pls. Dresden, August 1925. [Received 20th October 1925.]

In the case of an infestation of many years' standing by the pine-shoot moth, *Rhyacionia* (*Evetria*) *buoliana*, Schiff., near Chemnitz, Saxony, the author observed the following Hymenopterous parasites, *Pimpla examinator*, F., *P. turionella*, L., *P. detrita*, Hb., *Cremastus confluens*, Gr., and *Orgilus obscuratus*, Hal., and a Tachinid, *Actia* (*Thryptocera*) *pilipennis*, Fall.

LANDGRAF (T.). **Ein gefährlicher Obstbaumschädiger,** *Otiorrhynchus ligustici*, **der Liebstöckelrüssler.** [*O. ligustici*, a dangerous Weevil Pest of Fruit Trees.]—*Die kranke Pflanze*, ii, no. 8, pp. 167–170, 4 figs. Dresden, August 1925. [Received 20th October 1925.]

In the spring of 1925 young fruit trees near Hamburg were severely attacked by the weevil, *Otiorrhynchus ligustici*, especially newly-planted ones. The young crown twigs were gnawed until the bark had

been entirely removed so that the crowns had to be cut back. Moreover, a ring was gnawed round the stem just beneath the point where it was tied to the stake for support. The author believes that the moisture retained by the material used for tying the stem to the stake promotes the growth of fungi that are attractive to this weevil. Spraying with a 10 per cent. solution of carbolineum gave good results.

WIEDEMANN (—). **Vordringen der Fichtenblattwespe in Nordsachsen.** [The Advance of the Spruce Sawfly in North Saxony.]—*Die kranke Pflanze*, ii, no. 9–10, pp. 198–199. Dresden, September-October 1925.

Since 1840, deciduous trees have been increasingly replaced by spruce in the districts around Leipzig. In recent years these stands have suffered considerably from the attacks of *Lygaeonematus pini*, Retz. (*Nematus abietum*, Htg.), which first appeared about 1890. At first only the needles of 10–15 year old trees were attacked, but later on trees of all ages were infested. Since 1900 the infestation has extended southwards, and much loss is caused in areas where the sawfly is established. The measures hitherto tried have failed, but it is hoped that the use of aeroplanes for applying insecticide dusts may provide a solution.

KOMÁREK (J.). **Insektenmassenvermehrungen und der Vogelschutz.** [Insect Outbreaks and Bird Protection.]—*Anz. Schädlingsk.*, i, no. 10, pp. 109–111. Berlin, 1925.

Though the protection of birds should be encouraged, it is only rarely that they are able to suppress an incipient outbreak of insects, because their numbers in normal times are insufficient.

PHILIPPI (E.). **Die Steinobstgespinstblattwespe** (*Pamphilius* (*Lyda*) *nemoralis*, **L.**). [The Stone-fruit Web Sawfly, *Neurotoma nemoralis*.]—*Anz. Schädlingsk.*, i, no. 10, pp. 114–117, 3 figs. Berlin, 1925.

The larvae of the sawfly, *Neurotoma* (*Lyda*) *nemoralis*, L., occur every year in May in peach orchards in the Rhine Palatinate and are capable of defoliating the trees in 4–6 days. As a result of a series of experiments a spray of ¼ lb. Urania green in 25 gals. of a solution of lime and copper sulphate is recommended against them.

KIEBLER (—). **Die Skelettiermotte.** [*Hemerophila pariana*, L.]—*Schweiz. Zeitschr. Obst- u. Weinbau*, xxxiv, no. 22, pp. 380–381. Frauenfeld, 31st October 1925.

Some of the injury to apple recently ascribed to *Hemerophila* (*Simaethis*) *pariana*, L., in Switzerland is actually due to another moth, the apple leaf-miner, *Lyonetia clerkella*, L., which often occurs with it. In the Canton of Valais, where *H. pariana* appeared in abundance, spraying the apple trees with lead arsenate completely protected the foliage.

Ahlberg (O.). **Ueber die Biologie und die Entwicklungsstadien des *Liothrips setinodis* Reut.** [On the Biology and Developmental Stadia of *L. setinodis*.]—*Ent. Tidskr.*, xlvi, no. 3, pp. 146–151, 3 figs. Stockholm, 1925.

The early stages of *Liothrips setinodis*, Reut., are described from specimens taken in Sweden on *Epilobium angustifolium*. Like some other thrips, *L. setinodis* appears to depend on the activities of other insects, for it was found only in the upper parts of shoots infested by Psyllids. Pupation occurs in the ground near the food-plant.

Russo (G.). **La curva di sviluppo di un coleottero xilofago, il *Chaetoptelius vestitus* (Muls.-Rey) Fuchs.** [The Developmental Curve of a Xylophagous Beetle, *Hylesinus vestitus*.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. mat. e nat., Ser. 6, ii, no. 7–8, pp. 286–291, 2 figs. Rome, October 1925.

The pistaccio, *Pistacia vera*, is seriously attacked in Sicily by the Scolytid beetle, *Hylesinus* (*Chaetoptelius*) *vestitus*, Muls. & Rey, the annual loss being estimated at three million lire. The period of incubation varies from 10 days in summer to 15 in spring and 35 in winter. On hatching the larva begins mining in the sapwood and internal cortical layers. As a rule there are 4 moults, but 5 may occur in withered branches, and only 3 if the wood is fresh. The larval stage lasts 31 days in summer, 40 in spring and 60 in winter. On attaining maturity, the larva bores completely into the sapwood, and pupation occurs after a prepupal stage of 3–4 days' duration, this stage lasting 10–11 days.

Bezzi (M.). **Some Tachinidae (Dipt.) of Economic Importance from the Federated Malay States.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 113–123. London, October 1925.

The species dealt with include : *Sturmia inconspicua*, Meig., a parasite of *Amathusia phidippus*, Joh. (recorded from India under its synonym, *S. bimaculata*, Hart., as a parasite of *Spodoptera mauritia*, Boisd. [*R.A.E.*, A, x, 154]) ; *Winthemia semiberbis*, sp. n., parasitic on *Sesamia inferens*, Wlk. ; *Chaetexorista javana*, Brauer & Berg., on *Setora nitens*, Wlk. ; *Erycia basifulva*, sp. n., on *Tirathaba trichogramma*, Meyr. ; *Ptychomyia remota*, Aldr., on *Artona catoxantha*, Hmps. ; *Podomyia setosa*, Dol., on *Prodenia litura*, F. ; *Tricholyga sorbillans*, Wied., on *Amathusia phidippus* and *Notolophus posticus*, Wlk. ; *T. aberrans*, Strobl, on *Mahasena* sp. and *A. phidippus* ; and *Halidaya luteicornis*, Wlk., on *Parnara mathias*, F. The last named is redescribed, and a key is given to the three known species of the genus *Halidaya*. The author now agrees with Stein in treating *Clytho* as a synonym of it.

Karny (H. H.). **On some Tropical Thysanoptera.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 125–142, 12 figs. London, October 1925.

The Thysanoptera dealt with are from various tropical countries, especially Africa, and include the following new species : *Physothrips hargreavesi* on *Tephrosia*, *P. neavei* on *Ipomoea hildebrandti*, *Hoplandrothrips marshalli* on coffee, and *Liothrips postocularis* on *Ficus*,

all from Uganda ; *Oedemothrips ceylonicus* on *Cassia multijuga*, from Ceylon ; and *Chelaeothrips idoliceps* feeding inside rolled edge of leaf of *Ficus*, from Fiji. A key is given to the African and Mediterranean species of *Liothrips*.

Bodkin (G. E.). **The Fumigation of Citrus Trees in Palestine.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 143–149, 3 pls., 1 map. London, October 1925.

A general account is given of citrus cultivation in Palestine, where the conditions leave much to be desired. Abnormally close planting is a regular feature in many of the orange groves, and frequently the branches interlace to such an extent that the sun's rays are shut out from the soil and foliage beneath. Such conditions are apt to render the successful treatment of scale-insects an exceedingly difficult matter. The Coccids occurring in Palestine on *Citrus* are *Pseudococcus citri*, Risso (common mealy bug), *Icerya purchasi*, Mask. (Australian fluted scale), *Coccus* (*Lecanium*) *hesperidum*, L. (soft scale), *Lepidosaphes beckii*, Newm. (mussel scale), *Ceroplastes floridensis*, Comst. (Florida wax scale), *Parlatoria oleae*, Colv. (chaff scale), *Chrysomphalus aonidum*, L. (*ficus*, Ashm.) locally known as the black scale, and *C. aurantii*, Mask. (red scale).

Of these only the last two and *L. beckii* are of any great economic importance, *C. aonidum* being the most serious pest. It was probably first introduced from Syria some fifteen years ago, and has since spread through the northern districts of Palestine, but does not yet occur in the groves around Jaffa. Its introduction into this area would be of very serious consequences to the export trade, which was valued at over £425,000 in 1923–1924. The Jaffa type of orange does not seem to be more resistant to attack by scales than other varieties, but the white calcareous dust, distributed by traffic, that coats the trees during the summer months, may be responsible for the general absence of scale-insects in the Jaffa region. *C. aonidum* is extraordinarily abundant in some localities, the ripe fruit being totally obscured by the overlapping colonies of the pest. The Coccids occur also on the leaves, but seldom on the twigs or branches. *Eucalyptus* trees used as windbreaks may become heavily infested and act as alternate food-plants from which the grove may be reinfested after fumigation. Bananas and a variety of other plants are also liable to infestation, but not to the same degree. As a result of attack the leaves drop off prematurely and the fruit is undersized, as well as the entire crop being below the average. In the spring and early summer it is difficult to find the scales even in orchards known to be heavily infested, owing to the fact that they have not by this time multiplied to any great extent on the fresh foliage, though from September to March they are abundant. The bitter orange used as stock is inclined to be resistant to this pest.

C. aurantii is found all over Palestine, but seldom causes any wide-spread damage ; lemon trees are particularly liable to attack.

L. beckii occurs in the Jaffa district; it is proposed to treat the affected areas by fumigation in 1925.

Fumigation in Palestine was started on a scientific basis early in 1923, many modifications of the accepted methods being found necessary to meet local conditions. The dosage schedule employed has been in accordance with the no. 1 schedule (100 per cent.) as drawn up by the United States Department of Agriculture. In Palestine

fumigation can only be carried out during certain months. From November to the end of February climatic conditions are not suitable, and during March and April there is serious risk of injury to the young foliage and the setting of the flowers. The time of this critical period for the trees varies according to the altitude above sea-level or below, the months named applying to sea-level. In the Haifa area, at sea-level, the work has been carried out successfully from the end of April to the end of July, and again from September to the latter part of November. Where the nocturnal temperatures are less high it should be possible to continue fumigation without a break from April to November. Citrus trees in Palestine can withstand fumigation with hydrocyanic acid gas at temperatures considerably higher than those considered safe in other parts of the world. This is possibly due to their natural and necessary powers of resistance to the protracted, hot, dry summer. The fumigation operations have so far been directed entirely against the further spread of *C. aonidum*, and some 25,000 trees have been fumigated, representing about a quarter of the whole. The method of arranging the tents and generating the gas is described. Where the work has been done for two successive seasons, the scale has been eliminated, and increased growth of foliage as well as superior yields of fruit have been noticed. At present it would appear as though slightly better results are obtained by fumigating early, before reinfestation from the previous year's foliage has occurred. It is proposed that the work in future shall be carried on under the Plant Protection Ordinance recently instituted in Palestine.

Experiments are now being made with calcium cyanide dust.

DUTT (G. R.). **The Giant Mealy Bug and its Control.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 155–158, 3 pls. London, October 1925.

Monophlebus stebbingi var. *octocaudatus*, Gr., occurs every year at Pusa on many fruit trees, but is particularly abundant on peach, plum, mango and jak (*Artocarpus integrifolia*). It has only one brood a year. The eggs are laid in the soil near the base of the tree; large numbers are found in June, and these hatch towards the end of November. Upon hatching the insects crawl up the tree, and by February, when the flow of sap is vigorous, they are usually attached to the stem, branches and shoots of the trees. By the middle of April they begin moving down the trunk for oviposition, and by the end of May, as a rule, all individuals have left the trees. The digging up of the eggs in June, though apparently a reasonable control measure, has not prevented reinfestation, the reason being that many of the adults lay their eggs as much as 6 to 9 feet from the base of the tree. Attempts have been made to prevent the females from descending into the soil for oviposition, and these have given excellent results. Wherever possible, the trees should be sprayed with a fish-oil resin soap, 24 oz. to 4 gals. water, but in the case of large or tall trees, or where the foliage is dense, bands made of ordinary sann-fibre soaked in a mixture of coal-tar and crude oil emulsion in equal parts should be used. When a large number of the mealybugs collect on and around the bands they are sprayed with fish-oil resin soap. After four applications made on the 22nd, 24th and 28th of April and 1st of May respectively, 10,921 and 7,182 dead mealybugs were found at the base of each of two trees treated. Four more applications of the spray were

made, but after the 13th of May the mealybugs were brushed off and swept into a tin containing water with a layer of kerosene. This method is both simple and effective and more economical than spraying. Banding is necessary with both methods, as this arrests the downward march of the Coccids, which can therefore be collected in large numbers from one place. The irrigation water in the trench around the tree may have a small quantity of kerosene added to it, and the mealybugs can then be swept into the trench.

The natural enemies of this scale are the Coccinellid, *Sumnius renardi*, and a Dipterous parasite, but they do not occur in sufficiently large numbers to be of any practical use.

Uvarov (B. P.). **A New Grasshopper injurious to Rice in Siam.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 159–161, 5 figs. London, October 1925.

Quilta oryzae, sp. n., causes injury to rice in Siam. It is compared with *Q. mitrata*, St., from the Cocos Islands, examples resembling which have been recorded from Java and Cochin China, though the latter may prove to be a distinct species.

Ferris (G. F.). **The Generic Types of the Diaspidae (Hemiptera).—Introduction.**

Myers (L. E.). **The Genotypes of** *Diaspis* **and** *Aspidiotus*.—*Bull. Ent. Res.*, xvi, pt. 2, pp. 163–167, 2 pls. London, October 1925.

As the classification of the Diaspidae will probably always depend on the females rather than the males, because the latter are very difficult to obtain, only the females will be considered in these papers. The older and more comprehensive genera from which the majority of the smaller genera have been derived will be dealt with first.

As the material becomes available, the papers will be published in convenient units, probably by different authors, but every attempt will be made to maintain a uniform standard and type of treatment.

The types dealt with in the present paper are *Diaspis echinocacti*, Bch. (*calyptroides*, Costa), and *Aspidiotus hederae*, Vall. (*nerii*, Bch.).

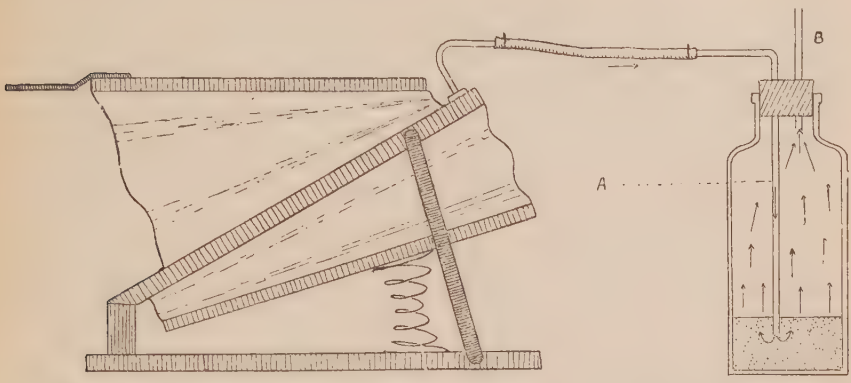
Trägårdh (I.). **Entomological Analyses of Trees.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 169–174, 6 figs. London, October 1925.

During recent years the author has developed a method of recording and graphically illustrating the part played by different insects in killing a tree. The method adopted is described, with instances of its application. The Scolytids dealt with in this connection include *Carphoborus cholodkovskyi*, recorded for the first time from Sweden.

King (H. H.) & Johnston (H. B.). **A Simple Form of Distributor for Insecticide Dusts.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 175–176, 1 fig. London, October 1925.

The simple apparatus described may be adapted as a knapsack duster by substituting a cylinder of compressed air for the bellows. The great advantages of this distributor are its great simplicity and the

fact that there is nothing to get out of order that cannot be readily repaired in the field. The density of the dust cloud produced depends on the pressure of air employed, and to a less extent on the height of the container.



The dust, to a depth of two or three inches, is placed in the container, and tube A is connected by means of a length of rubber tubing with a bellows. By working the bellows a current of air is forced in under the dust, and the atmosphere in the upper part of the container becomes heavily charged with the dust in suspension. This dust-laden air is driven out through tube B.

Fletcher (T. B.). **Migration as a Factor in Pest-Outbreaks.**—*Bull. Ent. Res.*, xvi, pt. 2, pp. 177–181. London, October 1925.

Although the fluctuations of insect abundance in regions of normal infestation can frequently be ascribed to such factors as parasitic control, or climate, anticipations with regard to the occurrence of pests are sometimes entirely upset by outbreaks that cannot be the result of abnormal local breeding, but must be attributed to immigration from other localities. In India many such cases occur. There is, generally speaking, a constant diffusion of individual insects beyond the limits of their particular breeding-area, but it is only when favourable areas are at some distance from each other that such dispersion is likely to be noticed. Islands form ideal observation grounds for such migrations. A rare, but interesting, example occurred in the Island of Krakatau (between Java and Sumatra), which was completely sterilised of all life by a volcanic outburst in 1883 that covered the whole island with pumice and ash to a depth of 100–200 ft. Twenty years later the vegetation on the island was again dense, and in 1921 an insect-fauna of over 400 species was collected, although the distance from any other land was at least 12 miles.

Examples of insects found far from their normal habitat are *Danais chrysippus*, a common butterfly on the plains in India, which is found in hill regions at elevations of 5,000 and 7,000 ft., where it is impossible for it to breed, and *Papilio erithonius*, a common *Citrus* feeder, also found in the hills, far from the habitat of its food-plant. At Pusa, in 1921, a sudden abundance of the Noctuid, *Achaea janata*, occurred, the moths appearing in thousands in a very fresh condition, though no unusual number of caterpillars had been observed, so that the sudden outbreak can only be ascribed to immigration. Besides these cases

of sporadic migration either by individuals or *en masse*, there are many examples of more or less regular migration, such as that of the migratory locusts. *Pieris brassicae* (common cabbage butterfly) affords an instance of fairly regular seasonal migration, generally appearing at Pusa during the first week of February, and passing through about three generations before the end of April, when cabbages are dried up and removed from the gardens. From May to January no sign of the species is to be found, although the food-plant is available from about October onwards. The inference is that the first butterflies seen on the wing are immigrants, probably from the hills in Nepal. In 1925 this immigration seems to have failed entirely, and there are no observations of the butterfly's occurrence for the last two or three years. It is suggested that its failure to appear may be connected with a recent extension of its range eastwards to the Khasi Hills in Assam. Whether its first introduction into this new locality was due to migration there is no evidence to show, but it is unlikely that the insect would be introduced by human agency, as Shillong, where it first appeared in 1921–1923 and is now established, is an exporter and not an importer of vegetables likely to carry eggs.

Migration also seems to be the cause of the annual outbreak of *Agrotis ypsilon* on the tal lands at Mokameh, on the south bank of the Ganges. The soil here is clay and is inundated annually to a depth of 5–15 ft. during the rainy season (June to September). Some elevated parts of the land are usually above water and ready for ploughing towards the end of September, but about 15 days later the ground becomes too hard for ploughing. The whole of the land after being under water is absolutely bare of vegetation when sown. Apparently the newly uncovered mud possesses some peculiar attraction (probably smell) for the female moths, as they presumably oviposit on it, the caterpillars being ready to attack the newly sprouting crops as soon as they appear. From May until mid-August no trace of the insect in any stage is seen, though there is no evidence of a resting stage, and it seems incredible that any stage could survive complete continuous submersion for about three months. It is known that the moth breeds freely in the hills during the summer, and, although there is no direct proof, it seems reasonable to conclude that the individuals appearing in the plains in early autumn are migrants from the hills. Whether there is a return migration about April is not known. The same species has recently been observed as a migrant in Egypt.

These theories have recently been corroborated to a certain extent in a paper drawing attention to the importance of air currents in the dispersal of insects [*R.A.E.*, A, xiii, 250].

GIRAULT (A. A.). **A New Parasite of Bug Eggs (Proctotrypidae).**—*Bull. Ent. Res.*, xvi, pt. 2, p. 183. London, October 1925.

Hadronotus hirsutioculus, sp. n., is recorded from the eggs of the Pentatomid, *Tectocoris lineola*, F., which attacks cotton, in Queensland. It occurred in company with *H. nigricornis*, Dodd, and was more abundant than that species.

NEAVE (S. A.). **The Imperial Bureau of Entomology.**—*Proc. 9th W. Indian Agric. Conf., Kingston, Jamaica, 1924*, pp. 27–30. Kingston, Jamaica, 1925.

This is an account of the work and objects of the Imperial Bureau of Entomology [*cf. R.A.E.*, A, xii, 388].

HARLAND (S. C.). **Studies in Cacao.—The Method of Pollination.**—*Proc. 9th W. Indian Agric. Conf., Kingston, Jamaica, 1924*, pp. 61–69. Kingston, Jamaica, 1925.

There has been much difference of opinion regarding the manner of pollination in cacao. Experiments have lately been carried out for the purpose of determining to what extent pollination occurs through the agency of ants or Aphids, and it was found, by eliminating crawling insects from the flowers, that they are responsible for the sporadic distribution of occasional pollen grains on the pistil, while unknown flying insects are evidently the pollinating agents in the case of flowers with abundant pollen on the stigma.

HANSFORD (C. G.). **Mosaic Disease of Sugar-cane.**—*Proc. 9th W. Indian Agric. Conf., Kingston, Jamaica, 1924*, pp. 76–82. Kingston, Jamaica, 1925.

In the course of this general review of the subject of sugar-cane mosaic an account of the known connection of *Aphis maidis* with the spread of the disease is included.

LE CERF (F.). **Note sur une Gelechide parasite de l'Alfa.**—*Ency. ent.*, Ser. B, iii, Lep., i, pt. 1, pp. 11–28, 19 figs. Paris, 1925.

Megacraspedus peyerimhoffi, sp. n., has been reared from larvae mining in alfa grass [*Stipa tenacissima*] in Algeria. The life-cycle is presumably much longer than that observed in the case of the European species of the genus, such as *M. dolosellus*, Zell. [*R.A.E.*, A, xi, 479]. Though the larvae were collected in the autumn of 1923, only one female moth had emerged by December 1924, the majority being still in the larval stage. At some part of its life this species is an external feeder, living amongst the leaves. The chief injury to the plant occurs at the end of the winter or early in spring, just about the time the ears are developing, the seed being rendered sterile owing to the destruction of the internal tissues of the stalks. The known species of this genus are compared.

BALACHOWSKY (A.). **Les Cochenilles nuisibles aux Aurantiacées en Algérie et leur traitement.**—*Rev. agric. Afr. Nord*, xxiii, nos. 322–324, pp. 653–655, 669–673 & 685–689, 10 figs. Algiers, October 1925.

The Coccids occurring on *Citrus* in Algeria are briefly described, and the measures advocated for their control are discussed. The species concerned are *Chrysomphalus dictyospermi*, *C. aonidum*, *Aspidiotus hederae*, *Parlatoria zizyphus*, *P. pergandei*, *Lepidosaphes pinnaeformis*, *Saissetia* (*Lecanium*) *oleae*, *Coccus hesperidum*, *Pulvinaria psidii*, *Pseudococcus citri* and *Icerya purchasi*.

JOHNSTON (H. B.). **A Note on Locusts.**—*Sudan Notes & Records*, vii, no. 2, pp. 91–101, 2 pls., 2 figs. Khartoum, December 1924. [Received 10th November 1925.]

The migratory locust of the Sudan is *Schistocerca gregaria*, Forsk., which periodically visits the country in large numbers; the last important invasion was in 1916. It occurs in the Sudan in two

phases, the swarming one, *gregaria*, and the solitary phase, *flaviventris*, Burm., which latter appears to be endemic in the country, occurring singly, and perhaps, in small, loose swarms. The causes, if such exist, that stimulate the production of the swarming phase are not yet known.

Locusta migratoria, L., is not plentiful in the Sudan, and it certainly has never been known to swarm, though its solitary phase, *danica*, L., may be met with commonly in the late summer and autumn. From a single pair of *danica* the author succeeded in rearing a brood that contained both phases.

The tree locust (*Anacridium moestrum melanorhodon*, Walk.) appears not to collect into large swarms in the Sudan, though it certainly possesses the gregarious habit in a modified form. The species is sometimes confused with *S. gregaria*, and the characters separating them are given. In habits the two species appear to differ considerably. *S. gregaria* in the immature stage consumes chiefly ground vegetation, grasses and herbaceous plants, but the tree locust has been so named from the habit of the hoppers of forsaking the ground soon after hatching and living on the foliage of trees. This locust can on occasion become of economic importance, as in the winter of 1923, when native orchards near Khartoum were invaded, lime and other fruit trees being in some cases entirely defoliated and the crop partly ruined.

Observations and breeding experiments on this species have given the following results. Scattered flights were reported during June; pairing commenced in this month, and females containing fully developed eggs were taken towards the end of it. Egg-laying, however, was not observed until after the first rains, and it became general about the middle of July. The eggs are laid in sand that has been moistened by rain, 150–200 in a single batch. Eggs laid in the laboratory hatched after 65 days. The young hoppers are extremely active and exhibit strongly developed climbing habits; their attraction to light is very marked. The hoppers pass through five moults, the total length of the life cycle from egg to adult being about 13 weeks.

This locust seems to be generally distributed over the Sudan. The favourite food appears to be the leaves of various species of *Acacia*; in one case *A. nubica* was left alone, while *A. ehrenbergiana* was stripped bare. *Zizyphus* sp. is often preferred to *Acacia*, while cotton is attacked only occasionally, and that in small areas. Feeding takes place in the late afternoon and early morning, and the adults have the habit of flying in swarms at night. The tree locust is singularly free from natural enemies; some birds prey on it, but only one case of parasitism by Tachinids has been recorded.

There is only one brood in the year. Whether this species possesses swarming and solitary phases is not yet known, but there are two distinct types of colouration in the hoppers, one being of a uniformly light green, and the other somewhat smaller and distinguished by numerous black spots on the body and legs. The adults arising from these two forms appear to differ markedly in size, the green hoppers producing the larger and stronger type of flier; and the solitary individuals encountered in the early part of the year invariably resemble this type.

Further information on distribution and probable swarming habits of this species is necessary, and instructions for collecting specimens and making observations are appended.

Symes (C. B.). **Observations on some Injurious Markings of Oranges.**— *Rhodesia Agric. Jl.*, xxii, no. 6, pp. 645–651, 6 pls. Salisbury, September 1925.

Considerable loss is often caused by the very great number of *Citrus* fruits that are unexportable on account of skin markings. The greater percentage of marked fruit occurs on trees exposed to the wind. Other factors are spraying and fumigation. The actual reason for injury by the latter is not known, but it appears to happen only when the fruits have been previously bruised or scarred. Very little damage can be attributed to a fungus disease, *Coniothecium*. Some injury may result from thrips, but markings definitely due to these insects are very rare, and the species responsible for damage to *Citrus* in Rhodesia has not yet been identified. The damage to oranges takes the form of definite "ringing" at the stem end of the fruits. Tissue covered by the calyx is also injured in the same way. It is only when fruits are quite small that the skin is sufficiently tender to be affected. In one heavy infestation the insects and the result of their feeding were first noticed early in November, when the fruits were the size of marbles. In fruits reaching maturity the early ringing has been pushed away so that a ring of new green skin-tissue separates the scar from the calyx. As the life-history of the thrips is not yet known, the only means of discovering outbreaks is frequent and thorough examination of the fruits during the period of their early development. An application of nicotine and soap as used for Aphids, or lime-sulphur (1 in 75) with a spreader, should be immediately applied, even when the thrips occur only in small numbers.

Departmental Activities. Entomology.— *Jl. Dept. Agric. Union S. Africa*, xi, no. 3, pp. 198–199 & 205–206. Pretoria, September 1925.

Termites of the genus *Coptotermes* have recently been found damaging the wood in houses in South Africa, in which country they have not previously been known. *Thercladodes kraussi* (sombre twig pruner), which caused serious injury to privet hedges in Natal in 1913 [*R.A.E.*, A, i, 279], remained practically unnoticed until July 1925, when it was found infesting a privet hedge in Pretoria. This beetle, which also passes its earlier stages in wild and cultivated olives, may become troublesome in Pretoria, where privet hedges are common.

Orchard spray programmes are given for the more troublesome insect pests and plant diseases in Natal.

King (N. L.). *Pinus insignis*, **Doug.** (*Pinus radiata* **D. Don.**), **in South Africa.**— *Jl. Dept. Agric. Union S. Africa*, xi, no. 3, pp. 220–232. Pretoria, September 1925.

No serious insect pests of *Pinus insignis* are known in South Africa, but a few minor ones have been recorded. *Odontionopa sericea* gnaws the needles, causing the upper parts to die. Larvae of the moths, *Nudaurelia cytherea* and *N. belina*, cause defoliation ; a severe infestation by the latter was exterminated by turning pigs on to the soil where the pupae occurred. Other defoliating caterpillars are *Gonimbrasia tyrrhea* and *Pachypasa capensis*, the latter being destroyed

by crushing or shrivelling with a blast lamp when congregated on the trunk before pupation. The Chrysomelid, *Colasposoma pusillum*, damages the needles, and the Coccid, *Coccus* (*Lecanium*) *hesperidum* var. *pinicola*, is often present.

GUNN (D.). **The Larger Cabbage Moth** (*Crocidolomia binotalis*, **Zell.**).— *Jl. Dept. Agric. Union S. Africa*, xi, no. 3, pp. 233–239, 5 figs. Pretoria, September 1925.

The caterpillars of *Crocidolomia binotalis*, Zell., damage cruciferous plants, especially cabbage, cauliflower, turnip and radish, in Cape Province, as well as various flowering plants. The eggs are deposited in masses of about 40–100 on the lower surfaces of the leaves, incubation lasting from 8 to 15 days according to the temperature. The young larvae feed gregariously on the lower surface of the leaves, but after about 2 weeks they scatter over the plants, spinning a thick silk web over the part where they are feeding. Large holes are eaten in the leaves, and the crown or heart is riddled. The larval period occupies 24 to 27 days in summer and sometimes as much as 51 days in winter. Pupation occurs in a cocoon just below the surface of the soil, and this stage lasts from 14 to 40 days. The moths are attracted to lights, but during the daytime hide under leaves ; in the insectary they lived from 15 to 20 days. Six generations were reared between 5th June 1921 and 31st July 1922. The Cape wagtail (*Motacilla capensis*) feeds on the larvae, and a Dipterous parasite (*Ctenophoraria blepharipus*) occurs, but is not sufficiently numerous to keep the pest in check. Spraying and dusting with arsenicals are the most successful remedies, the formulae recommended being 1 lb. Paris green and 2 lb. lime with 100 gals. water for spraying, or 1 lb. Paris green and 30 lb. lime for dusting ; and $1\frac{1}{4}$ lb. lead arsenate powder or $2\frac{1}{2}$ lb. paste to 40 gals. water. Young plants in seedbeds should be examined for caterpillars and should be treated as a preventive measure. As an adhesive, 2 lb. resin and 1 lb. soda is boiled in 1 gal. water and added to 50 gals. of spray solution. Spraying proved more successful than the dust, which was apt to get blown off the plants. For flowers, lead arsenate should be used. Clean cultural methods are of great value, especially for the destruction of pupae in the soil.

JURITZ (C. F.). **Effects of Spraying Citrus Trees on the Composition and Flavour of the Fruit.**— *Jl. Dept. Agric. Union S. Africa*, xi, no. 3, pp. 240–243. Pretoria, September 1925.

It has been demonstrated by experiment that the spraying of orange trees with lead arsenate lowers the acidity and impairs the flavour of the fruit, while producing no change in external appearance suggestive of this deterioration.

JURITZ (C. F.). **Chemical Investigations in regard to** *Citrus*.— *Union S. Africa Dept. Agric.*, Sci Bull. 40, 22 pp. Pretoria, 1925.

The information in this paper regarding the effects of arsenical spraying on oranges has been noticed from another source [see preceding paper], but it is suggested that before the results can be considered conclusive further data are required concerning the stage of development of the fruits compared.

PETTEY (F. W.). **Red Scale and *Fusicladium* Control in Pear Orchards.** —*Jl. Dept. Agric. Union S. Africa*, xi, no. 4, pp. 351–356. Pretoria, October 1925.

The results of experimental spraying for *Chrysomphalus aurantii* (red scale) on pears at Elsenburg during 1923–24 showed that paraffin emulsion, diluted in water, 1 : 20, applied in late winter when the buds are swelling, was not effective. Home-made engine-oil stock emulsion (2 gals. oil, 2 lb. soft soap, 1 gal. water), 1 : 15, applied in late winter when the buds are swelling, was found to be two or three times as cheap as proprietary miscible oils and more effective in 1924. It was cheaper than lime-sulphur, 1 : 10, and much more effective in cases of severe infestation.

A single dormant late winter spray of lime-sulphur, 1 : 10, applied when the buds were swelling, without spreader, has not satisfactorily controlled red scale on early blossoming varieties, but has controlled it for several seasons on a late variety, which allowed the spray to be applied several weeks later. A late winter spray of lime-sulphur, 1 : 10, applied when the buds were swelling, followed by a lime-sulphur spray, 1 : 50, applied when the flower buds were pink, was successful in 1923 and 1924 on another late variety, but did not control the scale on an early one, as it had to be used several weeks earlier. An additional application of lime-sulphur, 1 : 50, on the latter variety in 1923 gave good results.

A late winter spray of lime-sulphur, 1 : 10, followed by an application diluted 1 : 60, when the blossom buds were pink, and two later sprays, 1 : 75 or 1 : 80, plus spreader, put on with lead arsenate during the first two sprays for codling moth [*Cydia pomonella*], satisfactorily controlled both red scale and *Fusicladium* on Louise Bonne pears without causing much scorching of the foliage. The same application on Forelle pears controlled the fungus but not the scale. An additional application, diluted 1 : 75, plus spreader, put on when half the petals had dropped gave good results in 1923.

Some spray programmes for pear orchards in the Elsenburg district are given.

HAINES (G. C.). **The Cotton Insect Situation.**—*Jl. Dept. Agric. Union S. Africa*, xi, no. 4, pp. 361–365. Pretoria, October 1925.

This is an attempt to review briefly the cotton pest situation in South Africa as it exists to-day. The author has so far records of nearly 200 insects that are in some way or other connected with cotton, but he only deals with the more important ones [*R.A.E.*, A, vii, 330]. The bollworms, *Diparopsis castanea*, *Earias insulana*, *Heliothis* (*Chloridea*) *obsoleta* and *Pyroderces simplex*, are the most serious pests, but of the various remedial measures recommended [*R.A.E.*, A, xiii, 2, etc.], it is difficult to say which will prove the most effective.

With regard to the cotton Jassid, *Empoasca* (*Chlorita*) *facialis*, soil drainage and local conditions appear to be influencing factors and should receive further study. The only effective way to deal with soil pests attacking field crops is to maintain a close or dead season, preferably for two months or more each winter. There is need for a thorough study of the conditions influencing boll-shedding, and this should be done in connection with the study of the different pests, especially bollworms and plant bugs. The most urgent problem at the moment is to find effective and practical remedies for the bollworms, and ample facilities must be immediately available if the situation is to be coped

with. Although it may be several years before a Jassid-resistant cotton is available, the problem is well in hand [*cf. R.A.E.*, A, xiii, 527].

In the author's opinion, cotton insect control as a whole is not entirely an entomological matter, but concerns agricultural practices and plant-selection studies and is influenced by climatic conditions. Whether or not ratooning is profitable, is still a debatable question. Serious consideration should be given to the possibility of growing other crops and also of giving more attention to mixed farming, *i.e.*, live stock and field crops.

EDWARDS (W. H.). **Le Charançon du Bananier,** *Cosmopolites sordidus*, **Germ.**—*Rev. agric. de l'île Maurice*, no. 22, pp. 513–514. Mauritius, July–August 1925.

The weevil, *Cosmopolites sordidus*, Germ., is the chief banana pest in Mauritius. Eggs are deposited separately, usually on the bulbs at ground level, and hatch in 5–7 days, the insect being most injurious in the larval stage, which lasts from 15 to 25 days. The pupal period is of 6–8 days' duration, the weevil remaining another 4–5 days in the pupal chamber. It then hides in a leaf-sheath or below the ground near the corm, on which it feeds. The most efficient measures consist in the burning of all suspected plants, the planting of only healthy corms, and the employment of traps of pieces of banana corms.

DE SORNAY (P.). *Heteronychus plebejus*, **Scarabée s'attaquant à la la Canne.**—*Rev. agric. de l'île Maurice*, no. 22, pp. 514–517. Mauritius, July–August 1925.

The Dynastid, *Heteronychus plebeius*, attacks sugar-cane and maize in Madagascar, penetrating the soil and feeding on the eyes of the cuttings and piercing them when sufficiently tender. The shoots are sometimes severed at the point of attachment to the cutting. Leaves are left untouched, only the subterranean portions being attacked. Damp areas are usually selected, but in dry seasons the beetles return to the surface, though they are killed by the sun. They are found in great numbers under the refuse of the canes. During the rainy season the damage they cause is more marked ; after March when the floods are subsiding the beetles leave the damp places to lay their eggs on higher ground. The adult insects usually pair below ground. No natural enemy has been found at Nossi Bé. Ploughing destroys the larvae, and the soil should be dug up near the stump when the shoots begin to wither. Government assistance in the control of this pest is strongly urged in view of the importance of the development of the sugar industry at Nossi Bé.

PINTO DA FONSECA (J.). **De um novo parasita do caféeiro.** [A New Insect infesting Coffee.]—*Comm. Estudo e Debellação da Praga Caféeira*, Pub. no. 12, 8 pp., 1 pl. S. Paulo, 1925.

The Scolytid genus *Metacorthylus* has hitherto been represented by a single species, *M. nigripennis*, Blandf., from Panama. *M. affinis*, sp. n., is here described and figured from specimens taken on coffee in Brazil. The adults bore into the stems and larger branches of coffee bushes that have died a short time previously or are in an advanced stage of withering.

MOREIRA (C.). **Pulgões do Brasil.** [Brazilian Aphids.]—*Minist. Agric. Ind. e Comm., Inst. biol., Defesa agric.*, Bol. 2, 34 pp., 19 figs. Rio de Janeiro, 1925.

A brief account is given of the life-history of Aphids and of the usual measures adopted against them.

The species recorded from Brazil are *Phylloxera vitifoliae*, Fitch, *Anuraphis prunicola*, Kalt., *Aphis gossypii*, Glov., *A. maidis*, Fitch, *A. nerii*, Boy., *A. rumicis*, L., *A. sacchari*, Zehnt., *Brevicoryne brassicae*, L., *Rhopalosiphum nymphaeae*, L., *Toxoptera aurantiae*, Boy., *Amphorophora cosmopolitana*, Mason (*lactucae*, Kalt.), *Macrosiphum rosae*, L., *M. sonchi*, L., *Pentalonia nigronervosa*, Coq., *Eriosoma lanigerum*, Hsm., *Geoica phaseoli*, Pass., *G. floccosa*, sp. n., on roots of *Ipomoea stipulata*, and *Idiopterus brasiliensis*, sp. n., from *Phaseolus lunatus*. These new species and *Cerataphis brasiliensis*, Hemp., and *Brasilaphis bondari*, Mordv., are the only indigenous Brazilian Aphids known to the author [*cf. R.A.E.*, A, xii, 526].

MOREIRA (C.). **A Broca do Café,** *Stephanoderes coffeae*, **Hag.** [The Coffee Borer, *S. hampei*, Ferr.]—*Minist. Agric. Ind. e. Comm., Inst. biol. Defesa agric.*, Bol. 3, 25 pp., 3 pls. Rio de Janeiro, 1925.

This bulletin deals with the classification, stages, and bionomics of the coffee-berry borer, *Stephanoderes hampei*, Ferr. (*coffeae*, Hag.). The spread of this beetle, its natural enemies in Java, and the various artificial measures employed against it in coffee-growing countries are also discussed. Further study is needed before measures specially appropriate to conditions in Brazil can be defined.

MOREIRA (C.). **A Cigarrinha Vermelha da Canna de Assucar,** *Tomaspis liturata* **Lep. et Serv.** [The Red Froghopper of Sugar-cane, *T. liturata*.]—*Minist. Agric. Ind. e. Comm., Inst. biol. Defesa agric.*, Bol. 4, 15 pp., 5 pls. Rio de Janeiro, 1925.

In 1920 sugar-cane in the Brazilian State of Minas Geraes was found to be attacked by the Cercopid, *Tomaspis liturata*, Lep. & Serv., and an outbreak also occurred in 1924 in Rio de Janeiro. The injury is similar to that caused by *T. saccharina*, Dist., in the British West Indies. *T. liturata* occurs throughout the year. Oviposition takes place 9–10 days after mating, and the eggs hatch in 15 days. Though the ovaries may contain on the average 50–60 eggs, only 8–14 are laid. The larval stage lasts 44 days under favourable conditions, but may take 50 days. The adult stage may last as long as 20 days. *T. liturata* is active by night, and is attracted to light, a lantern being more effective than a strong light.

The measures recommended are burning of abandoned fields; cutting the canes about 8 inches from the ground; pulling up and burning infested roots; ploughing the ground to a depth of 10 inches and leaving it exposed to sunshine for 25 days before re-planting; and keeping the new field free from grasses, etc., likely to shelter the froghoppers. In Trinidad Urich has disapproved of the burning of the dead leaves because of the resultant destruction of natural enemies. In Brazil no parasites have been found, and the eggs are laid so close to the surface that they are destroyed when the dead leaves are burned.

Steiner (G.). **The Problem of Host Selection and Host Specialisation of certain Plant-infesting Nemas and its Application in the Study of Nemic Pests.**—*Phytopathology*, xv, no. 9, pp. 499–534, 8 figs. Lancaster, Pa., September 1925.

Data are given that show the ability of the plant-infesting Nematodes, *Heterodera radicicola*, *H. schachtii*, *Tylenchus dipsaci* and *T. tritici*, to distinguish and to locate their food-plants. The behaviour of different strains of one Nematode species towards the same food-plant is variable, these differences in infestation being a result of conditions in the pest itself and not within the plant. Any given species appears always to prefer the species of plant on which its parents lived. This preference grows with the number of generations that have lived on it, but, if forced by starvation, a given strain of Nematodes will attack a plant that it will completely ignore if a more preferred one is present.

The mechanism of this selection of food-plants is outlined, based upon the observations and experiments of Buerkel, Baunacke, Rensch and others [*R.A.E.*, A, x, 568; xiii, 102] and a close study of the morphology of the sense organs of the Nematodes concerned. This mechanism works apparently as follows:—The growing plants produce some root secretions, which are carried by the soil water and act as stimuli upon the Nematodes. The latter apparently perceive the stimuli with an organ called an amphid, or lateral organ, which is thought to be a chemical sense organ. Presumably with the aid of this the Nematode moves towards points of higher concentration of the stimulating fluid, and so finally locates its host. The structure of this organ in *H. schachtii*, *T. dipsaci* and *T. tritici*, is described for the first time, and its importance to the Nematodes in general is discussed. This mechanism has a practical application in respect of various control methods, such as Kühn's trap method, Baunacke's "Reizpflanzen" method, and Rensch's recently developed activation method, and in relation to the study of the immunity, resistance, attraction, and repellence of plants.

There is evidence that the harm Nematodes do to plants is toxic, rather than mechanical, since careful examination of plant tissues after attack shows no mechanical injury to the cells. The reactions of the plant must be brought about by the secretions from the salivary glands of the Nematode. The plant species, however, seem to react quite differently towards these toxins, and this is the point where the immunity problem begins, and with which future investigators into possibilities of control of plant-infesting Nematodes will have to deal.

Matz (J.). **Root Knot on Sugar Cane in Porto Rico.**—*Phytophathology*, xv, no. 9, pp. 559–563, 2 figs. Lancaster, Pa., September 1925.

Nematode infection causing root-knot of sugar-cane in Porto Rico can be detected by the yellow colour of the leaves and the shrivelling of the outer leaves in young cane three or four months old, the plants becoming stunted and bunched in appearance. Young canes, when severely infested, may die. Infestation has been found only in loose or sandy soil or subsoil.

Since Nematodes seem to be most abundant and injurious in soils where there is little stimulus to root growth, the best method of control is to increase this artificially.

Caesar (L.). **The European Corn Borer and the Latest Methods of Control.**—*Ontario Dept. Agric.*, Circ. 47, 8 pp., 4 figs. Agric. Coll., Guelph, October 1925.

The European corn borer [*Pyrausta nubilalis*, Hb.] has spread more than 200 miles east of Toronto, and its numbers in Ontario as a whole have at least doubled every year since its discovery in 1920. The damage caused by it is described. Remedial measures comprise cutting or breaking the stalks as low as possible, and the destruction of the borers in the stalks and ears by ensiling, burning, etc., and those in the stubble by ploughing them under completely. Dragging up of stubble when cultivating must be avoided, and all remedial measures should be completed before 1st June.

The need for legislation requiring every maize grower to adopt the necessary control measures on his own farm is pointed out.

Gibson (A.). **Observations on the Spruce Budworm.**—*Trans. R. Soc. Canada*, 3rd Ser., xix, sect. 5, pp. 195–205, 3 pls. Ottawa, 1925.

The history of the present outbreak of *Tortrix* (*Cacoecia*) *fumiferana*, Clem. (spruce budworm) in Canada has already been noticed [*R.A.E.*, A, xiii, 192, 193], many of the author's observations having been embodied in those reports. The spring feeding of the larvae may not necessarily greatly check the growth of the tree unless the buds are completely destroyed before the leaves unfold. As the larvae develop, they bite off the needles at their base and connect them together by silk so as to form a shelter, which they attach to the twig. More dead needles, frass, bud scales, etc., are gradually added to the shelter, so that the whole presents a reddish-brown appearance, encircling the twigs. When this type of defoliation extends over a tract of forest, it looks as though it had been visited by fire. Descriptions are given of the various stages of *T. fumiferana*.

Ferris (G. F.). **Notes on Coccidae XI. (Hemiptera.)**—*Canad. Ent.*, lvii, no. 9, pp. 228–234, 4 figs. Orillia, Ont., September 1925.

The new species described are *Marchalina azteca* from Mexico on *Pinus teocote*; *Pseudococcus adenostomae*, which is possibly only a variety of *P. crawi*, Coq., from California on *Adenostoma fasciculatum*; and *Phenacoccus serratus* from Ontario on *Fagus americana*.

Chittenden (F. H.). U.S. Bur. Ent. **Note on a Secondary Egg Parasite of the Celery Leaf-tyer.**—*Canad. Ent.*, lvii, no. 10, p. 260. Orillia, Ont., October 1925.

Syntomosphyrum modestum, Houd., is a hyperparasite, its host being *Microgaster congregatiformis*, Vier.; it was formerly erroneously recorded as an egg parasite of *Phlyctaenia rubigalis*, Guen. [*R.A.E.*, A, xi, 84].

Strickland (E. H.). **Prairie Problems in Entomology.**—*Sci. Agric.*, vi, no. 2, pp. 37–40. Ottawa, October 1925.

Whereas in Eastern Canada a large proportion of insect pests have been introduced with imported plants, the majority of the serious pests in the prairie districts of the West are indigenous, but have only

reached serious proportions as a result of altered conditions due to cultivation, etc. An example of this is *Porosagrotis orthogonia* (pale western cutworm), formerly considered a very rare moth, but now captured in thousands at trap lanterns. The larvae remain permanently below ground, provided that the soil is loose enough for them to move freely from plant to plant; failing this they appear above the soil and are more easily destroyed by natural enemies. The failure of the erstwhile dominant parasites can be traced in every instance to agricultural practices. It is essential to ascertain the effects of modification of the soil and the vegetation on the activities of a pest and also on the insects associated with it, particularly its parasites. Therefore, in the training of entomologists for Western Canada, a thorough grounding in ecology is more essential than a detailed knowledge of the many facts that deal with the control of insect pests by the use of poisons.

CLEVELAND (L. R.). **The Feeding Habit of Termite Castes and its Relation to their Intestinal Flagellates.**—*Biol. Bull. Mar. Biol. Lab.*, xlviii, no. 5, pp. 295–308, 1 pl. Woods Hole, Mass., May 1925.

Protozoa are present at every stage in the life-cycle of any termite caste where wood is eaten. A caste that does not harbour protozoa cannot eat wood, and therefore cannot live by itself. Adults of the second and third forms and soldier castes have lost this ability, and must be supported by other members of the colony. The soldiers can digest for themselves the partly digested wooden material that has passed through the alimentary canal of the xylophagous members of the colony, but the second and third forms, since they feed exclusively on the salivary secretions, must subsist entirely on predigested food.

CLEVELAND (L. R.). **The Effects of Oxygenation and Starvation on the Symbiosis between the Termite,** *Termopsis*, **and its Intestinal Flagellates.**—*Biol. Bull. Mar. Biol. Lab.*, xlviii, no. 5, pp. 309–326, 1 pl. Woods Hole, Mass., May 1925.

Experiments show that the effects of oxygenation and starvation on the protozoa in *Termopsis nevadensis* are in accord with those obtained by the incubation method [*R.A.E.*, A, xii, 339].

HERRICK (G. W.). **Manual of Injurious Insects.**—8vo, xxi+ 489 pp., 458 figs. New York, Henry Holt & Co., 1925.

This book is intended to serve as a work of reference on the commoner insect pests of the United States; the more general information contained in the opening chapters is, however, of wider application. Chapters are devoted to the systematic position, structure and transformations of insects, losses caused by insects, insects as disseminators of plant and animal diseases, useful insects, methods of insect control and insecticides, and insects and mites injurious to agricultural and horticultural crops.

In the main part of the book, under each plant or group of plants, a concise and accurate account is given of each of the more important pests, including distribution, description of larva and adult, nature and extent of injury, life-history, and control, followed by a few references to important papers dealing with it; the account of the insects attacking the various plants or groups of plants concludes with a list of the minor pests, with a reference to a published account of each, and a synopsis of the major pests in the form of a key.

The illustrations include a valuable series of over 100 maps, showing at a glance the distribution of particular insects in North America.

In his introduction the author draws attention to the tremendous advances that have been made in the science of economic entomology in North America during the last 20 or 30 years, especially in the perfection of insecticides and control methods. The scientific staff of the United States Bureau of Entomology has increased from 14 in 1900 to 433 in 1922, and its expenditure from £6,140 to £353,856 in the same time.

Goe (M. T.). **Eight Months' Study of Earwigs (Dermaptera).**—*Ent. News*, xxxvi, no. 8, pp. 234–238. Philadelphia, Pa., October 1925.

All attempts to induce *Forficula auricularia* to feed on various leaves and flowers failed, whereas raw meat, dead slugs, flies and grasshoppers, and living Aphids were readily eaten. Owing to reports that these earwigs destroy carpets and clothing, they were given woollen and cotton cloth, the latter also damped, but these materials were not touched, even when no other food was available. The presence of the females is apparently essential for the hatching of the eggs. They are carefully arranged in a nest in the soil, and during the incubation period (15–18 days) the female seldom leaves her brood, remaining in the soil for several days even after the eggs have hatched.

Mason (P. W.). U.S. Bur. Ent. **A Revision of the Insects of the Aphid Genus** *Amphorophora*.—*Proc. U.S. Nat. Mus.*, lxvii, art. 20, no. 2592, pp. 1–92, 18 pls. Washington, D.C., 1925.

An attempt has here been made to bring together all the species of the genus *Amphorophora* of the whole world. Keys are given to the alate and apterous viviparous females, and the following new species are described: *A. alni* on *Alnus incana*; *A. azaleae* on *Azalea indica*; *A. borealis* on checkerberry; *A. braggi* on lettuce; *A. davidsoni* on thimbleberry; *A. hayhursti* on *Ribes gracile*; *A. laingi* (*ampullata*, auct. nec Buckton) on *Onoclea*, *Polystichum* and *Asplenium*; *A. maxima* on salmonberry; *A. minima*; *A. mitchelli* on wild rhododendron; *A. pallida* on *Clintonia*; *A. pergandei* on currant; *A. reticulata* on raspberry; *A. rhododendronia* on *Rhododendron rhodora*; and *A. vaccinii* on *Vaccinium* spp. Takahashi's [*R.A.E.*, A, xi, 441] species of *Amphorophora* on *Pollia japonica* in Formosa is described as *A. takahashii*, sp. n. With this exception, these species are all from the United States of America. Two new names are given, *A. cosmopolitana*, for *Aphis lactucae*, Kalt. nec L., and *A. essigwanai*, for *Rhopalosiphum indicum*, Essig & Kuwana nec v.d.G.

Vickery (R. A.). U.S. Bur. Ent. **List of Parasitic Insects reared from Host Insects collected in the Vicinity of Brownsville, Texas.**—*Proc. Ent. Soc. Wash.*, xxvii, no. 7, pp. 137–141. Washington, D.C., 1st October 1925.

This is a list of parasitic Hymenoptera and Diptera reared during 1910 to 1917, mainly from Lepidopterous hosts; the parasites are arranged by families, the hosts and the month in which the host larvae were collected being given under each species.

Chamberlin (T. R.). U.S. Bur. Ent. **Some Observations upon** *Necremnus leucarthros* **(Nees) (Hymenoptera : Eulophidae).**—*Proc. Ent. Soc. Wash.*, xxvii, no. 7, pp. 142–144. Washington, D.C., 1st October 1925.

Necremnus leucarthros, Nees, was reared at Hyères, France, from cocoons of the alfalfa weevil, *Hypera variabilis*, Hbst. (*Phytonomus posticus*, Gyll.), from various localities in France and Italy. In captivity 8 females laid 212 eggs on 11 prepupae of *H. variabilis* (supplied at intervals) in 15 days, the number of eggs laid on a single host ranging from 6 to 40. Most of the eggs hatched on the day after oviposition, the larvae feeding as external parasites; pupae appeared in from 8 to 15 days, and adults in from 13 to 17 days. The greatest number of adults reared from a single host was 18. *N. leucarthros* was at first suspected of being a hyperparasite of the alfalfa weevil, but efforts to induce it to reproduce on the Chalcid, *Dibrachoides dynastes*, Först., gave negative results. Although it appears to be rare, it has a wide distribution (Sweden and Moravia being other recorded localities), and might prove useful if introduced into the United States.

Mississippi Plant Act of 1918 (as amended in 1920).—*Qtrly. Bull. State Plant Bd. Mississippi*, v, no. 1, pp. 1–8, 12–56. A. & M. College, Miss., April 1925. [Received 20th October 1925.]

The Act of 1918 is here reprinted with the rules and regulations adopted by the State Plant Board in accordance with it. The latter include a list of pests and diseases and of the plants likely to become infested.

Argentine Ant Campaigns successful.—*Qtrly. Bull. State Plant Bd. Mississippi*, v, no. 2, pp. 7–9. A. & M. College, Miss., July 1925.

Uniform success attended the campaigns organised in various towns in Mississippi during the autumn of 1923 and in 1924 against the Argentine ant [*Iridomyrmex humilis*, Mayr]. In some localities the numbers of the ants have been reduced to such an extent that complete eradication is expected in another year or two.

Insects in Stored Grain.—*Science*, lxii, no. 1608, Suppmt. p. xii. Garrison, N.Y., 23rd October 1925.

According to R. N. Chapman, weevils in stored grain could all be killed without resorting to chemical insecticides, if the grain were merely taken out of one bin on a very cold day and put into another, since it is the heat maintained in the depth of the binned grain that

keeps them alive. Some insects that infest food supplies may, however, be frozen without being killed. Probably some £40,000,000 worth of harvested grain and packed food products are destroyed annually in the United States by insects.

Brauer (A.). **Studies on the Embryology of** *Bruchus quadrimaculatus*, **Fabr.**—*Ann. Ent. Soc. Amer.*, xviii, no. 3, pp. 283–305, 7 pls. Columbus, Ohio, September 1925.

The life-history of *Bruchus quadrimaculatus*, F. (four-spotted bean Bruchid) is outlined, and an account is given of the development of the larva within the egg.

Fulton (B. B.). **Physiological Variation in the Snowy Tree-cricket,** *Oecanthus niveus*, **De Geer.**—*Ann. Ent. Soc. Amer.*, xviii, no. 3, pp. 363–383, 6 figs. Columbus, Ohio, September 1925.

Two distinct races of *Oecanthus niveus*, DeG., occur in Oregon, the one infesting trees, such as prune and apple and native growths of white ash [*Fraxinus americana*] and oak [*Quercus garryana*], and the other a bush-inhabiting form found on loganberry and raspberry and sometimes on blackberry, and also on wild rose thickets. The oviposition habits of these are discussed, and it is shown how they lead to confusion with *O. nigricornis*, Wlk. Individuals of the two races did not apparently mate in preliminary experiments, but in any case this would not be a frequent occurrence in nature, because of the sharply-defined ecological distribution. The two races occur on the same plants only at the dividing line between deciduous forest or orchards and areas of low bushes. The habits of the tree-inhabiting race differ but little from those of the same species in the eastern States, while the bush-inhabiting form in Oregon is a distinct physiological variety. The singing habits, which emphasise the differences between the two races, are discussed. Instances of physiological varieties of other species of insects are quoted, such as the three singing forms of *Nemobius fasciatus*, DeG., in Iowa.

Parker (H. L.) & Thompson (W. R.). U.S. Bur. Ent. **Notes on the Larvae of the Chalcidoidea.**—*Ann. Ent. Soc. Amer.*, xviii, no. 3, pp. 384–395, 3 pls. Columbus, Ohio, September 1925.

This preliminary record of investigations on the larvae of Chalcidoidea demonstrates the existence within the superfamily of a number of well-defined larval types. The authors divide these into two groups, based on morphological characters and feeding habits. The types are readily recognisable only in the primary larvae; in the later stages the morphological differences become much less apparent. The morphological characters of a species of *Anastatus* are discussed, and in view of its peculiar characteristics, this larva almost appears to have adopted recently the habit of endophagous parasitism, its morphology undergoing the changes that lead from the ectophagous to the endophagous type. At present, however, no convincing reasons in favour of such a hypothesis really exist. Another new form of caudate Chalcid larva is found in a species of *Miscogaster*, the morphological characters of which are described. The primary larva of *Stilbula cynipiformis*, Rossi (a parasite of ants) is also discussed.

Frost (S. W.). **The Leaf-mining Habit in the Hymenoptera.**—*Ann. Ent. Soc. Amer.*, xviii, no. 3, pp. 399–414, 2 pls. Columbus, Ohio, September 1925.

The origin of the leaf-mining habit in the Hymenoptera is discussed, with notes on the life-histories and descriptions of characteristic mines. Particulars of the families and sub-families concerned are given, with a list of the leaf-mining Hymenoptera and their food-plants and distribution, as well as an index to the species.

Childs (L.). **Possibilities of an Ovicide as an Auxiliary in Codling Moth Control.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 665–674. Geneva, N.Y., October 1925.

The question of the practicability of applying ovicides to control *Cydia pomonella* depends on whether the moths deposit eggs at such intervals as would permit of their destruction with an economical amount of spray, whether the periods of oviposition can be determined, and whether conditions of weather and moth activity are sufficiently typical in the different districts to make observations in one applicable to another. The use of an ovicide for the first brood of *C. pomonella* is feasible as an auxiliary to lead arsenate if a safe and effective ovicide is obtainable. The degree of benefit will depend largely on the temperature affecting the deposition of the first brood eggs, oviposition only occurring when the temperature at sunset is 60° F. or over. Second brood eggs are, as a rule, deposited over the whole period of activity of the moths, so that continuous spraying would be necessary. Incubation of first brood eggs at Hood River requires an average of 13 days, while second brood eggs hatch in from 5 to 8 days. A few well-timed applications for the first brood would reach more eggs than several applications for the second. In experiments in which the sprays were timed after observations of the progress of oviposition, 1·18 per cent. of the fruit was injured after two applications of a 3 per cent. oil emulsion, the same amount after an application of the oil combined with lead arsenate (4 lb. to 100 U.S. gals.), 5 per cent. when the lead arsenate (with a spreader) was used alone, and 21·1 per cent. on untreated trees. Some spotting of the leaves was observed with the use of the oil spray, but it did not seem to be serious, and the injury appeared to be less when the oil was combined with lead arsenate.

Chamberlin (W. J.). **The Gooseberry Root-borer** (*Xylocrius agassizi*, **Lec.).**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 674–679. Geneva, N.Y., October 1925.

Previous literature on the life-history and control of *Xylocrius agassizi*, Lec., is reviewed. The author is of the opinion that the life cycle covers a period of two years, since the adult beetles were common in 1923, entirely absent in 1924, and numerous again in 1925. Fully mature larvae were found in the roots and crowns of plants in Oregon in 1925 from 10th February onwards, regular emergence taking place about 25th March, and reaching its height about 5th April. Eggs are deposited usually near the ground, and in cases where the earth is loose around the stem, below the surface.

Paradichlorobenzene and crude naphthaline had apparently little effect on the larva. Calcium cyanide killed 33⅓ per cent., but when it was applied in sufficient quantity and close enough to kill, it also destroyed the plant.

Newcomer (P. J.). U.S. Bur. Ent. **Laboratory Experiments with Arsenicals in the Control of the Codling Moth.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 679–680. Geneva, N.Y., October 1925.

Only a summary of this paper is given. The addition of a casein spreader to lead arsenate or other arsenicals or combination sprays has materially improved the control of *Cydia pomonella*. The smallest amount of casein spreader, ⅛ lb. to 50 U.S. gals., gave better control when used with lead arsenate than any larger amount tested. Increasing the strength of lead arsenate reduced the number of holes made by the larvae and generally increased the number of stings, the total number of blemishes being reduced very little. A heavy application of lead arsenate, 1 lb. to 50 U.S. gals., produced rather better results than a light application of the same strength, but there was no appreciable difference in the effectiveness of equivalent amounts of paste and powdered lead arsenate. The addition of lime-sulphur to acid lead arsenate caused a reduction in efficiency, which was counteracted, however, by the use of casein spreader with the combination spray, the lime in the spreader apparently preventing or retarding the usual reaction between the lime-sulphur and the acid lead arsenate. The addition of a lubricating oil emulsion containing soap produced variable results, being poorer in the main than those obtained with lead arsenate alone. A lubricating oil emulsion with casein as an emulsifier did not have this effect, the control being appreciably better than that obtained from lead arsenate alone. Zinc arsenite was not so effective as lead arsenate, Paris green with lime or with casein spreader being slightly less good than the latter. Powdered calcium arsenate gave very poor control, although four brands were tested; but a paste calcium arsenate was about as efficacious as an equivalent amount of powdered lead arsenate.

Melander (A. L.). **Notes on Oil Sprays.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 681–686. Geneva, N.Y., October 1925.

Many apple and other fruit trees suffered badly from the severe frosts of December 1924, and though the injury is ascribed by many growers to the adoption of lubricating oil sprays, there is no evidence of general injury from their use when properly applied. The only cases of damage possibly to be assigned to oil were those directly traceable to an imperfect or broken emulsion. No correlation was found between the extent of winter injury and the use of oil sprays. Owing to the prevalence of leaf-roller [*Tortrix argyrospila*] in the Spokane valley, oil is applied at 8 per cent. strength, being double the concentration usually employed. In one orchard oil, water and calcium caseinate emulsifier had been placed together in a tank and sprayed without other emulsification than that caused by the agitator, but all trees were equally injured irrespective of whether they had been sprayed by the watery or oily portion of the tank. However, to avoid possible trouble in spraying with winter strengths of mineral oil it should be well emulsified and the application be made before flower buds become

exposed. The spray should not be applied in the autumn in northern orchards, nor in the spring until the danger of frosts is passed.

The value of spreaders in connection with contact sprays is doubtful, for if they make the spray spread thinly, it may lose in effectiveness. This was found to be the case in experiments with calcium caseinate spreader in lubricating oil sprays against the San José scale [*Aspidiotus perniciosus*] and eggs of *T. argyrospila*.

WILCOX (J.). **Observations on *Syneta albida*, Le Conte, in Oregon and Experiments for its Control.**— *Jl. Econ. Ent.*, xviii, no. 5, pp. 686–689, 1 pl. Geneva, N.Y., October 1925.

Syneta albida, Lec., appeared in orchards at Corvallis on 20th March 1925, and by 1st April was more numerous than in any previous year, after which it rapidly disappeared. Apples were preferred, though cherries and filberts in the immediate neighbourhood were also attacked. The injury to apples is mainly to the developing buds and blossoms, and on cherries to the leaves and developing fruit, and occurs as soon as the adults appear in early spring [*R.A.E.*, A, iii, 257]. Later on the ripening cherries show a shallow, rough scar. No satisfactory control was obtained for apples in orchards, as the beetles appear to be repelled by the sprayed foliage, eating only those parts that are untouched by the spray. A 4 per cent. nicotine dust, composed of hydrated lime and nicotine sulphate, applied to beetles on apple twigs in the laboratory, gave complete control in 10 minutes at a temperature of 70° F.; but it was less effective in the field.

One application of 5 lb. lead arsenate and 5 lb. hydrated lime to 100 U.S. gals. water, before blossoming gave good results on cherries. Plots sprayed with calcium arsenate showed serious scorching, which, however, did not occur with lead arsenate. In orchards that have not previously been sprayed for this pest, sprays of lead arsenate, 4–100, should be applied before and after blossoming in the first year, and before blossoming in succeeding years.

DOANE (R. W.). **Feeding Cows Insect-infested Cocoanut Meal.**— *Jl. Econ. Ent.*, xviii, no. 5, pp. 689–696, 2 figs. Geneva, N.Y., October 1925.

Copra cake imported from the East is usually more or less seriously infested with insects, the most important being *Lasioderma serricorne*, F., though *Silvanus surinamensis*, L., *Tribolium confusum*, Duv., and *T. castaneum*, Hbst. (*ferrugineum*, F.), are also more or less common. *Necrobia rufipes*, DeG., is also found occasionally, but it appears to feed on the larvae or dead beetles in the copra cakes, and not to attack the copra.

Dairy cows showed no dislike of infested coconut meal, and there was no difference in the amount or quality of the milk produced; nor did chemical analysis reveal any difference in the feeding qualities of infested meal.

LARSON (A. O.) & FISHER (C. K.). U.S. Bur. Ent. **The Rôle of the Bean Straw Stack in the Spread of Bean Weevils.**— *Jl. Econ. Ent.*, xviii, no. 5, pp. 696–703, 2 figs. Geneva, N.Y., October 1925.

Although transport of infested beans and the storing of beans and cowpeas in warehouses over the summer [*R.A.E.*, A, xiii, 47] are

largely responsible for the spread of *Bruchus obtectus*, Say, and *B. quadrimaculatus*, F., the bean straw stack is an important factor in their development, as such beans as have not been removed in threshing form a breeding-place for many generations. Records during 1924 indicated not only that the amount of infestation in the early crop was inversely proportional to the distance from the source of infestation, but that early beans were infested two thousand times as heavily as late ones. The source of infestation in a second crop or late beans was found to be an old straw stack, in which Bruchids were breeding freely and which had remained unprotected during the summer and preceding winter. Beans procured on the surrounding farms at threshing time showed that fields at least a mile and a quarter away were infested. Early in April 1925, *B. quadrimaculatus* and *B. obtectus* were found breeding in two stacks of bean straw that had been threshed the previous autumn, and the former also in a stack that had been in the open two winters and one summer, and the latter in one which had been in a shed three winters and two summers. Previous inspections indicated that this stack had become infested only during the last summer or autumn. Bean straw stacks should therefore be ploughed under for fertilising purposes before planting time.

SPULER (A.). **Baiting Wireworms.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 703–707. Geneva, N.Y., October 1925.

The wet-land wireworm, *Pheletes occidentalis*, Candèze, is now one of the most destructive pests of garden and field crops in the irrigated sections of the State of Washington, the infestation varying from about 80,000 to 400,000 per acre. Calcium cyanide, though an effective soil fumigant for this pest, is too expensive, as at least 300 lb. per acre are necessary to kill a high percentage of the larvae under favourable conditions. Baits, when used to concentrate the wireworms for soil fumigation, decrease the cost of treatment, 100 lb. of calcium cyanide per acre being sufficient where they have been used. Flour, including rice flour, is effective, but germinating seeds of most garden vegetables are more efficient, since they take less time to plant and attract more larvae per foot than the baits. The soil should be treated before the regular garden or field crops are planted, and before it becomes too warm near the surface for the wireworms to thrive in the first few inches of soil. Any plot of ground treated by baits in connection with calcium cyanide or with calcium cyanide alone must be used for some late crop such as potatoes, and it is necessary when baiting a field to have it free from weeds or other vegetation, as such weeds as the Russian thistle [*Salsola*] and mustard are attractive to wireworms. Baits should be allowed to remain in the soil for some time before being treated with calcium cyanide.

MORRILL (A. W.). **Commercial Entomology on the West Coast of Mexico.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 707–716. Geneva, N.Y., October 1925.

During the last few years, the growth of commercial relations between the States on the western coast of Mexico and the western part of the United States has led to the development of certain entomological work on a commercial basis. A brief description is given of the organisation of the work, and some of the more interesting

entomological features are reviewed. A general survey has been made of the pests of the Yaqui Valley, particular attention being paid to the study of the West Coast cotton boll weevil conditions.

The following Lepidoptera, approximately in order of their economic importance, are recorded on the West Coast: *Chilo loftini*, Dyar, and *Diatraea lineolata*, Wlk. (sugar-cane borers); *Heliothis obsoleta*, F. (common bollworm), a serious pest on maize and tomatos, and recently on peas, but not recorded on cotton during the last four years; *Phthorimaea glochinella*, Zell. (tomato leaf-folder), which is more injurious to the fruit than the leaves, appearing in tomato seed-beds early in the season, first as a leaf-miner and then as a surface feeder, and occasionally attacking the leaves of potatoes; *Bucculatrix thurberiella*, Busck (cotton leaf perforator); and *Laphygma flavimaculata*, Harvey (beet army-worm), a pest of garden peas during the autumn and winter months, which is controlled with 10 to 15 per cent. lead arsenate and dry sulphur when dusting for mildew.

The Capsids, *Halticus citri*, Ashm. (garden fleahopper), and *Pycnoderes quadrimaculatus*, Guen. (humped-back melon bug), are notable pests, the former on tomato plants and the latter on cucurbits, calcium cyanide dust being applied against the former, preferably between 10 a.m. and 4 p.m., when the plants are dry. In Mexico *H. citri* is not attracted to lucerne, even where heavily infested tomato fields are abandoned.

Thrips tabaci, Lind. (onion thrips) and *Heliothrips fasciatus*, Perg. (bean thrips) are the only Thysanoptera of special economic importance, the latter being injurious to beans, cotton and melons.

The cotton boll weevil is potentially the most destructive of the Coleoptera found on the West Coast. The author discusses its identity and is of the opinion that individuals from the Yaqui Valley and other parts of Sonora are more closely related to *Anthonomus grandis thurberiae* than to typical *A. grandis*.

Diabrotica variegata, Jac., and *D. balteata*, Lec., do considerable damage to young crops of nearly all kinds on the West Coast. *Epilachna borealis*, Kirby, has been recorded on cucurbits, but the so-called Mexican bean beetle [*E. corrupta*, Muls.] has not been observed. Serious damage has been caused to wheat by a termite, *Amitermes arizonensis*, Banks.

The melon Aphis [*Aphis gossypii*, Glov.] is common on melon and cucumber plants; *Chrysomphalus aurantii*, Mask. (California red scale) is a pest on *Citrus* in Sonora, but is replaced in the more humid sections further south by *C. ficus*, Ashm. (Florida red scale); *Lepidosaphes beckii*, Newm. (purple scale) was recorded only once on a citrus tree and never on the fruits in the public market; *Coccus* (*Lecanium*) *hesperidum*, L. (soft brown scale) and *Aspidiotus lataniae*, Sign., occur in rare instances on the fruit of papaya.

ROCKWOOD (L. P.). U.S. Bur. Ent. **An Outbreak of *Agrotis ypsilon*, Rott., on Overflow Land in Western Oregon.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 717–721. Geneva, N.Y., October 1925.

Outbreaks of *Agrotis ypsilon*, Rott., have usually occurred on lands that have been drained of water after submergence, at a time favourable to oviposition by the moths. Such outbreaks have been recorded for the Gangetic Plain in India, the Wabash River Valley of Indiana, and the cranberry bogs of Massachusetts. In India a marked preference

is shown by the female moths for oviposition on wet or muddy land directly after the receding of the water, and as they are strong fliers they may be attracted to such lands from considerable distances [*R.A.E.*, A, i, 507]. An outbreak occurred in Western Oregon in 1919, in a lake basin from which the water is drained off in spring, and it was estimated that 200 acres of the first sowing of oats were destroyed. A good crop of oat hay was harvested later from that part of the basin which was resown in June after the cutworms had destroyed the first sowing. Very few cutworms were found in the maize on the higher ground and this crop was not appreciably injured. This outbreak was controlled in four or five days by broadcasting a poison bait consisting of 25 lb. bran, 1 lb. white arsenic, 1 U.S. qt. molasses, 3 lemons, and water. A small amount of Paris green was used in place of white arsenic when that was exhausted. No results were observed for more than 48 hours, the slow working of the bait being attributed to low night temperatures. Natural enemies included various birds and a Tachinid, probably *Gonia exul*, Will. *Sagaritis consimilis*, Ashm., was reared from one larva.

Though details of the life-history of *A. ypsilon* in Western Oregon are scanty, the indications are that there are two generations a year. Outbreaks may be expected in the Pacific North-West on lands that have been submerged in late spring. The period of potential danger from oviposition is not definitely known, but probably occurs from about the end of April to late May or early June.

DE ONG (E. R.). **A Summary of the Answers Received to Questions on the Mechanics of Spraying.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 722–726. Geneva, N.Y., October 1925.

This paper is an analysis of answers to a questionnaire on spraying covering almost all the United States. The replies indicate considerable differences of opinion as to what constitute correct standards for the various types of sprays, different varieties of trees, and for the varying economic conditions prevailing throughout the country.

WOGLUM (R. S.) & LA FOLLETTE (J. R.). **The Value of Sprays for Black Scale Control in California.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 726–729. Geneva, N.Y., October 1925.

The indifferent results recently obtained from fumigation with hydrocyanic acid gas against *Saissetia oleae*, Bern., on *Citrus* have led to an increase in spraying as a method of control, oil sprays, either alone or in combination with sulphur mixtures, being the most popular. Two of the three most effective oil sprays used against this scale are combined with lime-sulphur, while the third is a plain miscible oil of a highly refined lubrication type. One miscible oil-lime sulphur combination has given the most satisfactory kill, on the average, although a plain miscible oil of low volatility, while giving less consistent results as a whole, has been effective where particular attention has been given to strength and application. Fruit scorching occurs from the combined sprays when the temperature is near 100° F., and is almost as severe on oranges when the trees are sprayed at a moderate temperature. Applications made on a hot day immediately followed by cool weather are less likely to cause injury than application on a cool, damp day quickly followed by a period of high temperatures.

By October the fruit has so far matured that sulphur scorching is a less serious factor. Lemons are less susceptible to injury than oranges, and spraying at temperatures as high as 100° F. has been done safely in the more arid districts. The plain miscible oil of lubricating type did no harm to foliage at concentrations of nearly 10 per cent., even at the highest temperatures. Spreader is essential when lime-sulphur and oil combinations are used, 1 lb. calcium caseinate to 100 U.S. gals. being the most satisfactory proportion. These sprays also control the citrus red spider [*Tetranychus citri*, McGregor], against which fumigation is ineffective. Particular attention should be given to the tops of sprayed trees. Fumigation ordinarily gives a more or less uniform scale kill throughout the tree, but with sprays the results have not been completely satisfactory in this respect. The use of towers sufficiently high for the tops to be reached has greatly improved the methods of spraying. The average cost of spraying is about two-thirds that of fumigating.

SEVERIN (H. H. P.). **A Natural Breeding Area of the Beet Leafhopper (*Eutettix tenella*, Baker) in the Sierra Nevada Mountains.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 730–733. Geneva, N.Y., October 1925.

Eutettix tenella, Baker, has been recorded in four valleys situated in the Sierra Nevada Mountains, the Honey Lake Valley at an altitude of 4,000 ft. being a natural breeding-ground. The insects were found breeding on red stem filaree (*Erodium cicutarium*) growing on rocky slopes in a sage-bush area. Early planting of beet with reference to the spring and autumn dispersal of *E. tenella* is of no practical value in these mountain valleys. An intensive survey over periods of normal precipitation as compared with dry years should be made of the foothills bounding these valleys to determine the relative abundance of beet leafhoppers. Test plots should be planted, and the percentage of curly leaf should be determined during each season. There is no evidence of a spring flight from the valleys in the Sierra Nevada Mountains to the Sacramento Valley.

SEVERIN (H. H. P.). **Percentage of Curly Leaf Infection in Beet Leafhopper (*Eutettix tenella*, Baker) and Winter Host Plants under Field Conditions.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 733–737. Geneva, N.Y., October 1925.

The author reviews his previous work on the subject. The percentage of curly-leaf that develops in beet fields in a natural breeding area when the spring brood beet leafhopper, *Eutettix tenella*, Baker, leaves the plains and foothills, depends on the number of individuals on each beet. Of the spring brood adults collected in the spring of 1924, 17 per cent. transmitted curly-leaf to sugar beets. Only 1 per cent. of the red stem filaree (*Erodium cicutarium*) was infected under natural conditions. White stem filaree (*E. moschatum*) has only been infected in greenhouse tests. After the return flights of the overwintering adults to the plains and foothills during a dry autumn, large numbers of leafhoppers may be found on perennials, and if these are not susceptible to curly-leaf, the percentage of infective adults would not increase.

Thus, *Atriplex spinifera* and *A. polycarpa* are not susceptible, but *A. fructiculosa* is infected under natural conditions. A small shrub, *Isocoma veneta*, serves as food-plant on the plains and foothills during a dry autumn and is susceptible to curly-leaf in greenhouse tests, but has not been found to be infected in nature.

Incomplete hibernation, during which the overwintering adults may live about a month without food, prevents the spread of the disease to plants on the plains and foothills and reduces the possibility of infection of the spring brood. Another factor that may prevent the rapid spread of the disease in red stem filaree during the winter, is the longer incubation period of the infective principle in the plant. It is known that when the beet leafhopper is provided with a healthy beet daily, the insect transmits curly leaf to fewer beets towards the end of its natural life. If this occurs in nature in the case of the overwintering insects, it may lessen the number of plants that may infect the spring brood nymphs. Moreover, if filaree were infected with curly-leaf by the overwintering females at the time of oviposition, it is possible that the plant would die before the eggs hatched during the long egg period. Curly-leaf would then have the effect of weeding out the diseased plants on the foothills. Eggs would fail to hatch if the plant died, and the number of infective spring-brood leafhoppers would thus be reduced.

PAYNE (N. M.). **Some Effects of *Tribolium* on Flour.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 737–744, 3 figs. Geneva, N.Y., October 1925.

In rearing large numbers of *Tribolium confusum*, Duv., it was found that the flour used acquired a pinkish tinge and had a distinct, pungent odour, showing, when tested, an exceedingly low viscosity as compared with normal flour; the elasticity was also markedly affected. On being exposed to the air, the flour did not recover its viscosity or elasticity, and it turned light brown. Flour infested with adults was more affected than that infested with larvae. Adults give off a characteristic secretion, soluble in water, and this may be responsible for the effect. A description is given of the apparatus employed in these experiments.

VAN LEEUWEN (E. R.) & VAN DER MEULEN (P. A.). **Coated Arsenate of Lead.**—*Jl. Econ. Ent.*, xviii, no. 5, pp. 744–749. Geneva, N.Y., October 1925.

An abstract of this paper has already been noticed [*R.A.E.*, A, xiii, 340]. In view of the fact that *Popillia japonica*, Newm., will not usually eat a killing dose of acid lead arsenate on foliage, which is thought to be due to the toxicity of the arsenical, the method of coating it with lead oleate was devised, so that the action of the digestive juices of the insect upon the poison would be delayed. The lead arsenate to be coated must be in paste form, owing to the fact that when dry it produces a certain amount of agglomeration, resulting in small porous lumps. When the lead oleate dries in contact with these lumps it is unsatisfactory as a coating. To ascertain the minimum quantity of lead oleate necessary for coating, a weighed amount of commercial lead arsenate powder ($Pb\ HAO_4$) was mixed with benzene containing a known quantity of lead oleate in solution, the benzene being allowed to evaporate at room temperature; and a small quantity

of the dried powder was shaken with water. As lead oleate is not wetted by water, the powder that is coated floats, whereas the uncoated sinks. Lead arsenate with less than 0·1 per cent. by weight of lead oleate is easily wetted, one containing 0·15 per cent. is part wetted, and 0·25 per cent. gives a slightly wetted powder. Larger amounts give powders that are scarcely wetted even when shaken for a minute or more. Feeding tests in cages on *P. japonica* were carried out with plain and coated lead arsenate, the latter showing a considerably higher percentage of kill.

Coated lead arsenate was used at various strengths in the field; and when used at the rate of 4 lb. paste to 50 U.S. gals. water the foliage was uninjured and 80 to 100 per cent. control was obtained. As the beetles do the greatest damage during a period of 6 to 8 weeks, repeated applications of the ordinary lead arsenate are necessary, and this frequently results in severe scorching. The coated lead arsenate spreads evenly and adheres to the foliage to an extent not previously attained with a spray mixture. The material applied thoroughly at the rate of 4 to 6 lb. of the paste to 50 U.S. gals. water leaves very little leaf surface unprotected, and gives a higher percentage of kill of the adults of *P. japonica* than any other poison previously used. Owing to its adhesive quality it is practically unaffected by rain, thus resulting in a saving of material and a reduction in the number of applications necessary.

HADLEY (E. W.). **The Use of Kerosene Emulsion in Control of the Scale *Toumeyella* sp. on Loblolly Pine.**— *Jl. Econ. Ent.*, xviii, no. 5, pp. 749–751. Geneva, N.Y., October 1925.

Seedbeds of loblolly pine [*Pinus taeda*] in Louisiana were found in December 1922 to be seriously infested by a species of *Toumeyella*. The seedlings were planted out in January 1923, and watched throughout the season. Very few were alive in October. In August 1923 they were covered with emerging young of the Coccid. Owing to a delay in spraying with the summer strength solution of kerosene emulsion (⅓ gal. emulsion to 2 gals. water), the seedling trees were badly affected by the scale, and the spray was only partly effective, probably because the insects had begun to form their protective covering. Two weeks later a second spray about double the strength of the first was used, resulting in material injury to the leaves and terminal buds, with little control of the scale, which by this time had reached the adult stage. The production of more than one brood of young during a single season greatly increased the difficulties of control. Experiments were subsequently carried out to determine the amount of kerosene emulsion that could be used on seedlings of *P. taeda* without injury, as a result of which an emulsion of 1 U.S. gal. kerosene, ½ U.S. gal. water, and ¼ lb. soap, diluted in 5 parts of water, is recommended; but in all commercial sprayings with kerosene emulsion it was found difficult to keep the solutions at uniform concentration.

MCCOLLOCH (J. W.). **Postal Revenues for Grasshopper Control.**— *Jl. Econ. Ent.*, xviii, no. 5, p. 751. Geneva, N.Y., October 1925.

Owing to the enormous damage caused by grasshoppers in Mexico in recent years, by a Presidential decree, all domestic postal matter

has to bear a special one centavo stamp in addition to the regular postage, the funds obtained from the sale of these stamps being applied to the campaign against this pest.

FELT (E. P.). **Lunate Onion Fly,** *Eumerus strigatus,* **Fall.**—*Jl. Econ. Ent.,* xviii, no. 5, p. 751. Geneva, N.Y., October 1925.

The larvae of *Eumerus strigatus,* Fall. (lunate onion fly) were recorded in 1911 in infested iris roots in Saratoga, and a number of adult flies were found in the same garden in July 1925, the insect having presumably maintained itself during the intervening period. It appears to be widely distributed in the eastern section of New York State, but has not yet been found in the western section.

FELT (E. P.). **Cottony Peach Scale,** *Pulvinaria amygdali,* **Ckll.**—*Jl. Econ. Ent.,* xviii, no. 5, p. 752. Geneva, N.Y., October 1925.

A somewhat severe and unusual outbreak of *Pulvinaria amygdali,* Ckll., due probably to climatic conditions, occurred in June in the peach orchards along Lake Ontario, quince bushes being even more badly infested than peach. In some orchards the infestation was so severe that the wood of the previous year was covered with old scales. The infestation was so uniform in many orchards as to suggest local distribution by wind. No previous outbreak has been recorded in New York State.

FELT (E. P.). **Evergreen Span Worm,** *Nepytia contracta,* **Walker.**—*Jl. Econ. Ent.,* xviii, no. 5, p. 752. Geneva, N.Y., October 1925.

Larvae identified as *Nepytia contracta,* Wlk., were collected in New York State on hemlock spruce [*Tsuga canadensis*] from 20 to 30 ft. high, in the vicinity of large sugar maples [*Acer saccharinum*]. Numbers of these caterpillars were found on the foliage in July 1925, the upper third of the trees being dead or nearly so. It is possible that these may have killed the upper parts of the trees and apparently gave rise to conditions that caused the limbs below the severely affected area to turn upward towards the light.

FLANDERS (S. E.). **Longevity of the Adult Codling Moth.**—*Jl. Econ. Ent.,* xviii, no. 5, pp. 752–753. Geneva, N.Y., October 1925.

Eight hundred larvae of the codling moth [*Cydia pomonella*] were collected in the spring of 1925 in California from bands placed on apple and walnut trees the year before. From the individuals from the walnut trees, 141 males and 223 females developed, and eggs were deposited by 158 females. The average length of life of the adults from the overwintering larvae was 28·8 days, the life of the male probably ending soon after pairing. A table is given of the individual records of 27 females living 39 days or longer. The relatively long life of the codling moth in this district and the fact that the adults from the overwintering larvae may emerge at any time between May and July, while causing an overlapping of broods, apparently extend oviposition so that a few of the eggs of the overwintering brood moths are laid too late to result in infested walnuts, and most of the second brood larvae fail to mature on the walnut.

Hill (C. C.). **Biological Studies of the Green Clover Worm.**—*U.S. Dept. Agric.*, Dept. Bull. 1336, 19 pp., 15 figs. Washington, D.C., September 1925.

A full account is given of the Noctuid, *Plathypena scabra*, F. (green clover worm), based on investigations carried out in Tennessee in 1914–16, of which a popular account has already been noticed [*R.A.E.*, A, vii, 201]. This moth is widespread in the eastern half of the United States and Southern Canada, where the larvae feed normally on various leguminous crops, but occur also on a number of wild plants [*R.A.E.*, A, viii, 384, 390; xi, 397]; in Tennessee, lucerne (*Medicago sativa*) appears to be the preferred food-plant.

All stages of the insect are described and illustrated, with details of the life-history. The oviposition period may last about 11 days; the eggs hatch in 2–5 days in summer, and in 8–14 days in spring; the larval stage lasts on an average 23 days. The mature larva constructs a cocoon of earth or fragments of leaves, loosely webbed together with silk, either on or just below the surface of the ground, and pupates in 2–6 days. Normally, the pupal period lasts from 7 to 24 days, according to the season; it is believed, however, that the insect sometimes hibernates in this stage.

Of the 14 Hymenopterous parasites of *P. scabra* recorded, the author reared the following: *Apanteles harnedi*, Vier., *Meteorus* sp., *Mesochorus* sp., *Microgaster facetosa*, Weed, *Microplitis varicolor*, Vier., and *Rhogas nolophanae*, Ashm. The last was the commonest parasite at Nashville, Tenn., in 1914; the cocoon is formed from the shrunken and stiffened skin of the caterpillar, not more than one parasite being found in each. Of the 14 Dipterous parasites recorded the author reared: *Hypochaeta eudryae*, Smith; *Phorocera flavicauda*, Wulp; *Trichophora ruficauda*, Wulp, which usually pupates inside the pupal skin of the host, which is almost entirely filled by the puparium; and *Winthemia quadripustulata*, F., the eggs of which were found on the thorax of the host larvae; in one case the parasite pupated outside the pupa, in another, inside.

The parasites of *P. scabra* not previously noticed in this *Review* are:—Hymenoptera: *Euplectrus comstocki*, How., *E. platyhypenae*, How., *Hemiteles* sp., and *Rhogas canadensis*, Cress. Diptera: *Compsilura concinnata*, Meig., *Exorista blanda*, O.S., *E. amplexa*, Coq., *Phorocera claripennis*, Macq., and *Hypochaeta longicornis*, Schin.

Nabis ferus, L., and *Podisus maculiventris*, Say (green soldier-bug) were found in considerable abundance predacious on the young larvae in lucerne fields and are doubtless valuable factors in control. In the autumn large numbers of the larvae are killed by the fungus, *Botrytis rileyi*.

Zoology and Entomology.—*38th Ann. Rept. Pennsylvania Agric. Expt. Sta. 1924–25*, Bull. 196, pp. 32–33. State College, Pa., July 1925.

The work in connection with red spider [*Paratetranychus pilosus*, C. & F.] on apple has shown that miscible oils will kill a large percentage of the eggs, if applied at the time of the delayed dormant spray. Cold mixed calcium caseinate emulsions made with various types of oils, ranging from a viscosity of 12 to 250 Saybolt at 100° F. have been used successfully, those with higher viscosity being more satisfactory. The cultivation of peach orchards before April, combined with cleanliness in the autumn and the removal of dropped fruit, has helped

to reduce the infestations by the oriental fruit moth [*Cydia molesta*, Busck]. Various materials (miscible oil, calcium caseinate, skim milk powder and powdered glue) have been tested to see if they could replace soap as a spreader in liquid nicotine spray against Aphids. Without lime, all the materials tested were inferior to fish-oil soap, but with the addition of lime, they either equalled or exceeded the soap standard. As foliage spotting occurred on turnips with all the mixtures containing lime, further trials on a variety of vegetable crops are needed before recommendations can be made.

Mercury bichloride, at the rate of 1 oz. to 8 U.S. gals., gave excellent results for the control of the cabbage root maggot [*Phorbia brassicae*, Bch.]. The time of application and condition of the soil at the first treatment are important factors. The first application should be made as soon as the eggs are present in numbers in the soil about the stems of the plants, and the field should be freshly cultivated so that the liquid may penetrate down around the stem of the cabbage.

Satisfactory results were obtained with various soil fumigants against millipedes in lettuce cold frames. The materials used were nicotine sulphate in water, 1–500, applied at the rate of 1 U.S. gal. to 2½ sq. ft.; 2 per cent. home-mixed nicotine dust worked into the soil a week before sowing; calcium cyanide, at the rate of 600 lb. per acre, worked into the soil two weeks before sowing; and a soot-naphthalene compound mixed with equal parts by volume of sand and applied at the rate of 150 lb. of soot-naphthalene per acre two weeks before sowing.

BONNET (L. O.). **Phylloxera-resistant Vineyards.**—*California Agric. Expt. Sta.*, Circ. 288, 24 pp., 13 figs. Berkeley, Cal., May 1925. [Received 24th October 1925.]

The planting of resistant root stocks is almost the only method used in most vine-growing districts of the world as a protection against *Phylloxera*, and this paper deals with the practical application of this method in Californian vineyards.

Hand Book of American Cotton Association Boll Weevil Control Campaign (Season of 1924-25).—*Amer. Cotton Assoc.*, 32 pp. St. Matthews, S.C. [1925]

The losses sustained by the American cotton crops of 1921 and 1922 as a result of attack by boll weevil [*Anthonomus grandis*, Boh.] were estimated at an aggregate of about £200,000,000. The American Cotton Association, therefore, undertook the leadership of a general campaign, as a result of which 933 cotton demonstration farms of 10 acres each were established in 1923. The movement was enthusiastically endorsed by growers. These were responsible for the success of the control measures, applied under simple and practical instructions. Many letters indicating the success of the campaign are quoted. In one of these it is stated that four good applications of calcium arsenate will result in a bale of cotton per acre on good land under heavy weevil infestation. With the use of poison, 1,250 lb. of seed cotton was obtained per acre, whereas from the same type of land without poison only 700 lb. was produced. It has been proved conclusively by the testimony of hundreds of farmers that the plan of cotton culture and weevil control as applied under the supervision of the Association increases the yield of cotton per acre by one-third.

In the past two years the Association has expended nearly £50,000 in field demonstration work in eleven States, and the results obtained have fully justified the expenditure. If all the 800 infested counties of the entire cotton-growing area could be covered by demonstrations, etc., as has been done in Georgia, South Carolina and Alabama for the past two years, the weevil would soon be definitely controlled.

WADE (J. S.). **A Bibliography of the European Corn Borer** (*Pyrausta nubilalis*, **Hbn.**).—*U.S. Dept. Agric.*, Misc. Circ. 46, 20 pp. Washington, D.C., September 1925.

In the preparation of this bibliography, which is arranged under authors, an effort has been made to bring together references to all of the more important available European and American literature regarding *Pyrausta nubilalis*, Hb. (European corn borer) up to 1st January 1925.

MOZNETTE (G. F.). U.S. Bur. Ent. **A Pest in the Mango Nursery.**—*Qtrly. Bull. State Plant Bd. Florida*, ix, no. 3, pp. 121–122. Gainesville, Fla., April 1925.

The mite, *Tarsonemus latus*, Banks, is a serious pest of young mangos in nurseries. As the terminal buds unfold, the mites collect in numbers on the lower surface of the leaflets and cause speckling of the leaves by sucking out the juices, The injured leaves become so distorted that the whole plant has a shrivelled appearance. The mite is described. The best remedy is a dust of sublimed flowers of sulphur, applied with a knapsack duster to the lower surfaces of the leaves. This treatment should be given at weekly intervals, two applications generally proving sufficient. During this time, the plants should be watered with a hose, in order to avoid washing the dust off the plants. Liquid lime-sulphur is apt to scorch the foliage.

Quarantine Department. Important Interceptions during the Quarters ending 31st March and 30th June 1925.—*Qtrly. Bull. State Plant Bd. Florida*, ix, nos. 3 & 4, pp. 125 & 137. Gainesville, Fla., April & July 1925.

The principal pests intercepted were *Platyedra* (*Pectinophora*) *gossypiella*, Saund. (pink bollworm), in cotton seed from China and in a shipment of cotton from Cuba; *Aleurocanthus woglumi*, Ashby (blackfly), on *Citrus*, coffee and *Gardenia* from Cuba and Jamaica; *Coccus viridis*, Green (green scale), on jasmine from Cuba; *Parlatoria* sp., on lime from Dominica, and on orange from Bahamas and Brazil; and *Anastrepha ludens*, Lw. (Mexican orange maggot), in grapefruit from Mexico.

DOZIER (H. L.). **The Obscure Scale attacking Pecan Trees.**—*Qtrly. Bull. State Plant Bd. Florida*, ix, no. 4, pp. 129–133. Gainesville, Fla., July 1925.

An account is given of *Chrysomphalus obscurus*, Comst. (obscure scale) as occurring on wild and cultivated pecans in Texas, with the remedies used against it. This scale is not as yet a serious pest in Florida, nor has it been observed on pecans.

Proceedings of the 6th Conference Western Plant Quarantine Board Denver, Colorado, May 10-14, 1924.—*California Dept. Agric.*, Spec. Pubn. 54, 100 pp. Sacramento, Cal., 1925.

The quarantine conditions in the various western States are reported on by the individual representatives.

Balaninus caryae, Horn (pecan weevil) and *Enarmonia* (*Grapholitha*) *caryana*, Fitch (pecan shuck worm), which are serious pests of pecans in several districts of the southern United States, were intercepted on this crop in Arizona; but as a result of the quarantine measures and inspection services no new pest was introduced or became established in Arizona during 1923 as a result of plant imports. The few changes made in the quarantine regulations during that period are given. The co-operation between the Federal Horticultural Board and the Arizona Commission of Agriculture and Horticulture for the eradication of *Parlatoria blanchardi*, Targ. (date palm scale) has continued and there is every reason to believe that this scale has been eradicated from the Salt River Valley, where it was very common. As a result of road inspections, live adults and larvae of *Anthonomus grandis*, Boh. (Mexican cotton boll weevil) were found in several lots of cotton bolls from infested territory. During the year serious injury by *Diatraea lineolata*, Dyar (corn borer) was recorded from various localities in the State, and *Pyroderces rileyi*, Wlsm. (pink corn worm) caused serious damage to grain *Sorghum* in the field and in storage. *Anthonomus grandis thurberiae*, Pierce, was discovered in cultivated cotton fields near Tucson; a non-cotton zone was immediately established and the necessary restrictions enforced. Though no damage was done to the cotton in 1923, it would possibly become a serious pest if not checked in time.

Forficula auricularia, L., has recently become established in California, but it is hoped it will be eradicated before it becomes a serious pest. Further infestations of *Tylenchus dipsaci*, Kühn (alfalfa stem nematode) and *Mineola indiginella*, Zell. (apple leaf crumpler) have been found. Apparently, the only means of controlling the pepper weevil [*Anthonomus eugenii*, Cano] is the collection and burning of all remaining plants in the fields.

T. dipsaci was reported from Fremont County, Colorado, for the first time and is apparently fairly widely distributed.

A list of pests intercepted in British Columbia is given, most of which have previously been intercepted [*R.A.E.*, A, ix, 13]. Additional ones are *Aspidiotus forbesi*, Johns., on fruit trees and ornamental shrubs from Europe, Japan and United States; *A. hederae*, Vall., on ornamental shrubs from Europe; and *A. rapax*, Comst., and *A. zonatus*, Frnf. (*quercus*, Sign.), on mistletoe from United States.

Reeves (G. I.). U.S. Bur. Ent. **Some Early History of Alfalfa Weevil Quarantine.**—*California Dept. Agric.*, Spec. Pubn. 54, pp. 65–73. Sacramento, Cal., 1925.

Some of the past history of the quarantine against the alfalfa weevil [*Hypera variabilis*, Hbst.] is reviewed, showing that efforts should be confined to those measures that definitely assure positive results, in view of the fact that this pest is mainly spread by natural means, unaided by traffic, and that its natural spread cannot be checked by quarantines. The few artificially planted colonies have had little or no effect on the general progress of the pest.

CORY (E. N.). **The Potato Tuber Moth.**—*Univ. Maryland Extens. Serv.*, Circ. 57, 3 pp. [College Park, Md.] October 1925.

The potato tuber moth, *Phthorimaea operculella*, Zell., which in its larval stage is a pest of both field and stored potatoes, was probably introduced into Maryland from Virginia. As no morphological differences have so far been discovered between the tobacco split worm and the potato tuber moth, it is probable that they represent strains of the same species, having different food preferences. The larvae mine the leaves and tunnel the stems of the potato plant early in the season, and as the plants mature, they leave the dying stems, entering any potatoes that may be exposed. The larvae that mature in the tops enter the ground to pupate or construct cocoons in dead leaves or rubbish ; the adults from them lay eggs in the tubers, and the resulting larvae feed on the tubers either in transit or storage.

The control measures for the insect in the field include, for the autumn crop, the removal of all potatoes immediately they are taken up ; for the spring crop, the destruction of all tubers too badly infested for planting, ridging to avoid infestation before harvesting, and spraying or dusting with arsenicals.

FRACKER (S. B.). **Division of Insect and Plant Disease Control.**—*Bienn. Rept. Wisconsin State Dept. Agric. 1923-1924*, Bull. 69, pp. 52–100, 16 figs. Madison, Wis., 31st December 1924. [Received 9th November 1925.]

A campaign against grasshoppers was undertaken in the summer of 1924, the bait formula consisting of 100 lb. sawdust, 1 U.S. qt. sodium arsenite in liquid form (8 lb. to the U.S. gal.), 1 U.S. gal. molasses, 5 lb. salt and 7 U.S. gals. water mixed in a special machine. The most important pest on cranberries continues to be the black-headed vineworm [*Rhopobota naevana*]. San José scale [*Aspidiotus perniciosus*] is increasingly prevalent, and as lime-sulphur sprays are no longer giving adequate control, only miscible oils are being used. Bordeaux mixture, 4–4–50, applied to the lower surface of the leaves, is the most effective means of control for *Empoasca fabae* (potato leaf-hopper).

White grubs, *Lachnosterna* (*Phyllophaga*) spp., caused serious damage in the State forest nursery at Trout Lake. The life-cycle in the southern part of the State is three years, though in other districts this is sometimes extended to four. The heaviest flights of beetles were observed in 1919 and 1923, and another is expected in 1927. The early cultivation of grass and weedy land adjoining the nursery, thus forcing the beetles to oviposit elsewhere, was found to be so successful that other control measures were not practised on any extensive scale.

A list of insect pests for 1924 in tabular form is given.

TILLYARD (R. J.). *Aphelinus mali*. **Distribution of the Parasite of the Woolly Aphis in New Zealand during the Season 1924-25.**—*N.Z. Fruitgrower & Apiarist*, reprint, 4 pp. Auckland, N.Z., 16th June 1925.

The work in connection with the distribution of *Aphelinus mali*, the parasite of the woolly aphis [*Eriosoma lanigerum*], in New Zealand has been continued [*R.A.E.*, A, xiii, 18], and a record number was sent to all parts of the Dominion, details of which are given. Several cases have been noted of its having been found at distances of from

3 to 7 miles from the nearest liberation point, and there now seems no doubt that it is maintaining itself under normal orchard conditions and is extending its range wherever its host is available.

[New South Wales.] **Proclamations under the Plant Diseases Act, 1924.**—*Govt. Gaz.*, no. 97. Sydney, 17th July 1925.

To control Trypetids, all fallen *Citrus*, pome and stone fruits must be collected every three days, and destroyed if infested. Not later than 1st July each year, all Seville oranges of the intermediate crop must be removed from the trees, and all the main crop not later than 1st September. To prevent the spread of *Cydia pomonella*, all apple, pear and quince trees and suckers must be effectively sprayed with lead arsenate in the proportion of not less than 18 oz. dry powder, or 2 lb. paste, to 50 gals. water, not less than 5 days after the petals have fallen, the spray being repeated during the fifth and sixth weeks, and again during the ninth and tenth weeks after the fall of the petals. All such trees must be kept free from dead bark and broken limbs, which must be destroyed, and all fallen fruit must be collected at least once every three days, and all infested fruit destroyed.

The introduction into New South Wales is prohibited of numerous plants and fruits, except under certain conditions as to containers, inspection and destination.

The insects declared to be pests for the purposes of the Act include:—

Lepidoptera: *Aegeria exitiosa, Agrotis* spp., *Anarsia lineatella, Crocidosema plebeiana, Cydia molesta, C. pomonella, Datana ministra, Dichocrocis punctiferalis, Earias huegeli, Ephestia* spp., *Euxoa infusa, E. radians, Heliothis obsoleta, Hemerocampa leucostigma, Loxostege affinitalis, Nygmia phaeorrhoea, Persectania ewingi, Phragmatiphila truncata, Phthorimaea operculella, Platyedra gossypiella, Plodia interpunctella, Plutella maculipennis, Porthetria dispar, Pyralis farinalis, Pyrausta nubilalis, Pyroderces* spp., *Sitotroga cerealella*, and *Tortrix divulsana*. Diptera: *Agromyza phaseoli, Mayetiola* (*Cecidomyia*) *destructor, Hylemyia antiqua, Merodon equestris, Phorbia brassicae, Phytomyza* spp. and any Trypetidae. Coleoptera: *Adoretus* spp., *Anomala* spp., *Anthonomus grandis, Araecerus fasciculatus, Bruchus* spp., *Calandra granaria, C. oryzae, Cathartus* spp., *Chrysobothris femorata, Cosmopolites sordidus, Cylas formicarius, Diabrotica vittata, Echocerus cornutus, Epilachna* spp., *Lachnosterna* spp., *Lasioderma serricorne, Lepidoderma albohirtum, Leptops squalidus* (*hopei*), *Listroderes obliquus* (*nociva*), *Monochamus* (*Monohammus*) spp., *Monolepta australis, Prosayleus phytolymus, Rhabdocnemis obscura, Rhizopertha dominica, Silvanus surinamensis, Tribolium confusum* and *Xyleborus* spp. Rhynchota: *Aleurodes vaporariorum, Blissus leucopterus, Dicyphus tabaci, D. minimus, Empoasca fabae* (*mali*), *Eutettix* spp., *Lygus pratensis, Nezara viridula, Nysius vinitor, Perkinsiella saccharicida, Psylla* spp., *Typhlocyba australis* and any Aphids or Coccids. Miscellaneous: *Bruchophagus funebris, Chortoicetes pusilla, C. terminifera, Caliroa* (*Eriocampoides*) *limacina, Iridomyrmex humilis, Harmolita* spp., *Oedaleus senegalensis, Smynthurus viridis*, and any Thysanoptera, Termitidae, or mites.

LEISHMAN (E.). **Notes on Woolly Aphis of the Pear** (*Eriosoma pyricola*.)—*Jl. Dept. Agric. S. Australia*, xxix, no. 2, p. 172. Adelaide, 15th September 1925.

An outbreak of *Eriosoma pyricola*, Bak. & Dav., was recorded on pear nursery stock in 1917, and in spite of drastic pruning and manuring a recurrence took place in two years. The Aphids, though found at various times of the year, appear to be more numerous during the summer months, the attack being almost entirely confined to the fibrous roots. Remedial measures are difficult of application, owing to the fact that the insect works entirely underground, none having been observed on the trunks or branches of the pear trees.

GURNEY (W. B.). **Grasshopper Swarms and their Control.**—*Agric. Gaz. N.S.W.*, xxxvi, pt. 9, pp. 635–640, 6 figs. Sydney, 1st September 1925.

The most important grasshopper that appears in swarms in New South Wales is *Chortoicetes terminifera*, although *C. pusilla*, *Oedaleus senegalensis* and *Cyrtacanthacris exacta* have occasionally appeared in destructive numbers in various parts of the State. The swarms of *Chortoicetes terminifera* appear for one or two seasons at intervals (1907–08, 1917–19, 1924–25) ; wet seasons are unfavourable to it, and natural control is effected by birds, parasites, and predacious insects ; these factors probably account for its periodicity.

The life-history is described [*R.A.E.*, A, vii, 262 ; xii, 411] ; there are two main broods a year. The eggs are deposited in clusters in the soil at depths ranging from 1 to 3½ inches, the average number in each cluster being about 36 ; a female may lay more than one cluster. The swarm congregates for egg-laying, the average number of holes per square foot over several acres being 300, while there are sometimes as many as 800 ; the egg-beds vary in size from a few hundred square yards to fifty or more acres. The great advantage gained by locating the egg-beds is therefore obvious, as the young grasshoppers can be destroyed as soon as they hatch.

The immature grasshoppers are controlled most successfully on pasture land by spraying with a solution of 1 lb. sodium arsenite (preferably containing 75 per cent. arsenious acid) and 4 lb. treacle or molasses (preferably treacle) in 16 gals. water. The sodium arsenite and treacle should be dissolved in hot water in separate vessels, mixed when almost cool, and diluted to the correct strength. The spray should be applied as a fine mist on strips of grass about 30 ft. wide in front of the advancing swarms, then directly on to the swarms, as it kills partly by caustic action. From 75 to 80 gallons of spray are sufficient for one acre and cost about 12 shillings. Severe tests have proved that this spray, made and applied as directed, is not harmful to sheep.

Calcium cyanide dust was only effectual when it was applied directly on to the swarm, and was too expensive for general use, although it might be used in an emergency to protect cultivated ground, or where water is very scarce ; diluted with an equal proportion of talc powder, it only killed about 50 per cent. of the immature grasshoppers.

On cultivated ground poison baits should be scattered over a strip 30 to 50 feet wide in front of the advancing swarm, the formula recommended being 1 lb. sodium arsenite or Paris green, 1 lb. molasses or treacle, and 24 lb. bran.

The importance of concerted action against grasshoppers is emphasised, and a scheme for co-operative control outlined.

McCarthy (T.). **The Poisoning of Fruit Flies. The Killing Efficiency of Certain Arsenicals.**—*Agric. Gaz. N.S.W.*, xxxvi, pt. 9, pp. 667–669. Sydney, 1st September 1925.

The results of laboratory experiments with sweetened solutions containing toxic substances for the control of *Ceratitis capitata* are recorded. The majority of the flies fed on lead arsenate solution (3 oz. to 3 gals. water) took from 65 to 90 hours to die, and would most probably take longer under field conditions, this making it doubtful whether the spray as at present recommended is efficient. Calcium arsenate was more satisfactory, even at half the strength of the lead arsenate, although two feeds of this, also, seemed necessary to kill. Three other substances tested, white arsenic (arsenious oxide) (1 oz. to 4 gals. water), sodium arsenite (1·8 oz. to 4 gals. water) and potassium arsenate (1·8 oz. to 4 gals. water, and 0·9 oz. to 4 gals. water) were all much more toxic, one feed being sufficient to kill the flies. It has yet to be ascertained, however, whether any of these three substances can be used as a spray, at a sufficiently reduced strength to avoid injury to the foliage, while maintaining a higher toxicity than lead arsenate.

Hill (G. F.). **The Victorian Termites.**—*Victorian Nat.*, xlii, no. 4, pp. 85–91, 1 pl. Melbourne, 7th August 1925.

This paper briefly describes the 16 known species of termites, representing 9 genera, from the State of Victoria.

Jarvis (E.). **Cane Pest Combat and Control.**—*Queensland Agric. Jl.*, xxiv, pt. 3, pp. 219–223. Brisbane, 1st September 1925.

Experiments with baits consisting of sugar-cane in thin sections, megass, and bran, each boiled for 5 minutes in a strong solution of sodium arsenite, for poisoning the larvae of [*Lepidoderma*] *albohirtum* (greyback cockchafer) have given promising results. Laboratory experiments with benzine as a soil fumigant against these cane grubs were also made; $\frac{1}{5}$ oz. applied to cages containing 80 cu. in. of moist soil in March killed 100 per cent. of the third stage larvae in 3 days, but half this amount was inadequate. In July 100 per cent. mortality in 2 days was obtained with larvae about to pupate, by $\frac{1}{2}$ oz. doses, through 4 in. of soil. The action of benzine is doubtless quicker when the larvae are feeding vigorously and respiration is active (as in March) than when they are lying inert in the pupal chamber, with respiration less frequent and pronounced (as in July). Laboratory experiments with benzine containing naphthalene in solution showed that the mixture would kill all third stage larvae in 5 days, when applied at the rate of 1 drachm to a cage containing 48 cu. in. of soil.

The relative merits of paradichlorobenzene and carbon bisulphide as soil fumigants against the root-eating cane grubs are discussed; while the former substance remains active in the soil from 6 to 8 weeks, and is thus valuable in penetrating to those grubs that happen to be in compact lumps of soil, not easily accessible, the latter is effective only for 24 to 40 hours; consequently, although paradichlorobenzene may be used at any time during January or February, for carbon bisulphide the soil must be in the right condition, *i.e.*, not too wet for rapid penetration. Paradichlorobenzene loses this superiority when in solution. At the present price of paradichlorobenzene, the cost of treating 1 acre of sugar-cane with $\frac{1}{8}$ oz. injections would not exceed £3.

Various Hesperids, particularly *Padraona marnas*, Feld., have been plentiful on sugar-cane in certain districts ; the larvae feed and finally pupate in a tube from 2 to 4 inches long, formed by drawing together the edges of the cane leaves. Parasites of *P. marnas* bred during June 1925 included *Chalcis parflavipes*, Gir. Broad-leaved grasses are probably the native food-plants of several of the Hesperids in Queensland, consequently grassy headlands are a likely source of infestation.

A Gryllid was reported as injurious to cane-fields in one district. The measures suggested against it include flooding infested land and collecting the insects by hand when they float to the surface of the water, poison baits, and naphthalene, which may be buried in drills beside the cane.

Further consignments of adults and puparia of *Ceromasia sphenophori*, the Tachinid parasite of *Rhabdocnemis obscura*, were distributed during July and August ; on several farms where care has been exercised in reserving suitable breeding-places for the flies, they have given definitely beneficial results and seem likely to become firmly established.

JARVIS (H.). **Fruit Fly Investigation.**—*Queensland Agric. Jl.*, xxiv, pt. 3, pp. 234–238. Brisbane, 1st September 1925.

Severe frosts during June were probably responsible for the destruction of a large percentage of the fruit-fly larvae and puparia during the winter. The value of the cold storage of fruit as a measure against the fruit-fly, *Dacus ferrugineus* (*Chaetodacus tryoni*), is emphasised, but this needs to be done in the district in which the fruit is grown, as 24 hours' transit is sufficient for larvae just hatched to become nearly full-grown. At a conference of Government entomologists on 17th June the following points were agreed upon :— The probability of the migration of *Dacus ferrugineus* from one district to another, the importance of wild fruits in the spread of fruit-flies, and the inefficiency of lures, as at present used, for their control.

In view of the increase of *Aspidiotus perniciosus* (San José scale) in the Stanthorpe area in recent years, a short popular account of it is given. One of the local food-plants is the English hawthorn (*Crataegus oxyacantha*). The larvae of the Coccinellids, *Orcus australasiae*, *O. chalybaeus*, and *Rhizobius hirtellus*, are of considerable importance as predators, and the predacious larvae of a Tineid moth have been of great value recently in controlling the scale. Spraying with lime-sulphur during the dormant season is recommended as the best method of control, and good results may also be obtained with miscible oil (1 part in 20-30 parts water).

TRYON (H.). **The Bean Fly (Diptera—*Agromyza phaseoli*).**—*Queensland Agric. Jl.*, xxiv, pt. 3, pp. 243–244. Brisbane, 1st September 1925.

An account is given of *Agromyza phaseoli* (bean-fly), mainly quoted from Jarvis [*cf. R.A.E.*, A, xiii, 522]. It is distributed through the coastal area of Queensland and New South Wales, and is found in the East Indies, the Philippines, and Madagascar. As no satisfactory method of control has been devised, and no varieties of beans resistant to it have been discovered, it is essential to concentrate on preventive measures. When beans are sufficiently badly attacked to be worthless, they should be immediately burnt ; and care should be taken that if

cowpeas (which may be used as a trap-crop) are growing near, they do not serve as a source of infestation. Repellents consisting of odorous volatile substances have not so far produced any satisfactory result ; the occasional efficacy of an old remedy, the scattering of lime on the ground at the base of the plants, may possibly be due to the liberation of ammonia by the action of the lime on nitrogenous substances in the soil. Some promise has been given by spraying the plants with Bordeaux mixture and a spreader, such as soap solution, to deter the ovipositing females by covering the upper leaf-surfaces ; piling earth round the base of the stems may also be of some value, by inducing the development of adventitious roots above the injured area.

Newman (L. J.). **Report of Economic Entomologist.**—*Western Australia : Ann. Rept. Dept. Agric., 1922-23,* pp. 22–25. Perth, W.A., 1923. [Received 20th October 1925.]

The subsequent report to this has already been noticed [*R.A.E.*, A, xiii, 456]. Pests not recorded there include *Nysius vinitor* (Rutherglen bug), particularly injurious to stone fruits, *Ephestia kühniella* (Mediterranean flour moth), the larvae of which do much damage to dried fruits, and *Gonocephalum walkeri*, the larvae of which in conjunction with a web-worm were the cause of injury to lawns.

Pests on forest trees include a Scolytid in red gum [*Eucalyptus rostrata*] and jarrah [*E. marginata*], and an Aphid, *Chermes* sp., on pine, an introduced pest that needs prompt attention.

Bushell (N.). **Sweet Potato Weevil** (*Cylas formicarius*).—*Territ. New Guinea Dept. Agric.*, Leaflet 25, 1 p. Rabaul, 23rd July 1925. [Received 2nd November 1925.]

Cylas formicarius is now reported from New Guinea. A brief account of this weevil is given ; the remedial measures suggested are burning all infested sweet-potato tubers, clean cultivation, the removal of plants of the family Convolvulaceae, particularly morning glory [*Ipomoea digitata*], and the selection of planting material that is free from infestation.

Bodenheimer (F. S.). **The Olive Fly** (*Dacus oleae* **Rossi) in Palestine.**—*Zionist Organ. Inst. Agric. & Nat. Hist., Agric. Expt. Sta.*, Circ. 6, 16 pp., 3 figs. Tel-Aviv, January 1925. [Received 14th October 1925.]

This paper is in Hebrew, but has a summary in English. *Dacus oleae*, Rossi (olive fly) is common all over Palestine and is one of the main reasons of the inferior crops of olives. Along the coastal plains there are 6 generations annually, and 5 in the mountains. The variety of trees bearing the more luscious fruit and containing the greater amount of oil are the ones most severely attacked. This also applies to indigenous trees. Only 3 out of 11 indigenous varieties were found not to be attacked by *D. oleae*.

The usual bait-sprays, etc., are recommended, the best time for spraying in the coastal plains being indicated.

Two parasites have been bred, *Opius concolor*, Szepl., and a species of *Eupelmus*, probably *E. urozonus*, Dalm., but these decrease rapidly after August, whereas *D. oleae* develops 2 or 3 further generations after September.

PETCH (T.). **The Genus** *Cladosterigma*, **Pat.**—*Trans. Brit. Myc. Soc.*, viii, pt. 4, pp. 212–215. Cambridge, 22nd May 1923. [Received 18th November 1925.]

The genus *Microcera*, some of the species of which are parasitic on Coccids, is found to be closely related to *Cladosterigma*, and *M. clavariella* appears to be identical with *C. fusisporum*. Three species of the same general structure as *Cladosterigma* have been found in Ceylon, but as they are distinct from this genus, a new one, *Trichosterigma*, is erected. The species include *T. clavisporum*, sp. n., on a caterpillar and *T. attenuatum*, sp. n., on a Pentatomid.

PETCH (T.). **Studies in Entomogenous Fungi. iii.** *Torrubiella*; **iv. Some Ceylon** *Cordyceps*; **v.** *Myriangium*; **vi.** *Cephalosporium* **and associated Fungi; vii.** *Spicaria*.—*Trans. Brit. Myc. Soc.*, ix, pts. 1 & 2, pp. 108–128; x, pts. 1 & 2, pp. 28–80; pt. 3, pp. 152–189, 5 pls., 11 figs. Cambridge, 29th September 1923, 26th September 1924 & 15th May 1925. [Received 18th November 1925.]

Among a number of entomogenous fungi of the genus *Torrubiella* the following are parasitic on Coccids:—*T. tomentosa*, *T. rubra*, *T. luteorostrata*, *T. brunnea*, *T. lecanii*, *T. tenuis*, *T. sublintea* and *T. barda*. An account is given of these, based on a series collected in Ceylon and the eastern Tropics and from South America, and the effect of infestation on the host is described. Entomogenous species of *Cordyceps* in Ceylon include *C. barnesi*, on larvae of cockchafers; *C. dipterigena*, on flies of the genus *Mydaea*; *C. unilateralis* var. *javanica* on ants; and *C. blattae*, sp. n., on *Blattella* (*Blatta*) *germanica*. Notes are given on several species of *Isaria* occurring in Ceylon on insects, but of which the perithecial form has not yet been discovered. These include *I. sinclairi*, on pupae of *Cicada*, and *Isaria* sp. on Orthoptera, on cocoons of *Thosea recta* and on a larva of *Homona coffearia*. *Hirsutella saussurei* occurs throughout the tropics on hornets; *H. citriformis* is recorded on a Pentatomid and *H. floccosa* on a leafhopper. The structure and classification of the species of *Myriangium*, some of which are parasitic on Coccids, are discussed. *M. duriaei* is found in England only on *Chionaspis salicis*, its distribution coinciding with that of *Microcera coccophila* on the same host; it is also recorded from Ceylon on *C. biclavis*, *Aspidiotus camelliae* and *A. aurantii*, and from the Philippines on *Mytilaspis* and *A. aurantii*. *Myriangium thwaitesii*, sp. n., parasitic on a Coccid in Ceylon, is described, and a key is given to the entomogenous species of this genus, including also *M. curtisii* and *M. montagnei*.

An account is given of *Cephalosporium* (*Acrostalagmus*) *lecanii*, which is commonly found in Ceylon on the Coccids, *Coccus* (*Lecanium*) *viridis*, *Saissetia* (*L.*) *nigra*, *S.* (*L.*) *hemisphaerica*, *L. expansum*, and *Ceroplastes* sp., and on *Aleurodes* sp., and has also been recorded from New South Wales on *S.* (*L.*) *oleae*. Other entomogenous fungi dealt with are a species recorded as *Hyalopus yvonis*, attacking *Aspidiotus perniciosus* on coconut leaves in Martinique, and considered by the author to be identical morphologically with *C. lecanii*; *C.* (*A.*) *coccidicolum*, from a Coccid in a greenhouse in Paris, which appears to differ from *C. lecanii* biologically but not morphologically; *C.* (*A.*) *longisporum*, sp. n., described from Ceylon on *Icerya purchasi*, and frequently accompanied by another fungus, *Melanospora parasitica*,

which proved to be parasitic on *C. longisporum*, and not on the insect ; *C.* (*A.*) *coccorum*, sp. n., described from *Chionaspis salicis*, and *Lepidosaphes ulmi* in England ; *Spicaria javanica*, found accompanying *C. lecanii* in Ceylon on *Ceroplastes* sp., *C. viridis* and *I. purchasi*, and also occurring on caterpillars of *Euproctis flava* and egg-masses of *Homona coffearia* ; and *Gonatorrhodiella coccorum*, sp. n., found in Ceylon with *C. lecanii* on *C. viridis* and also alone on *Aleurodes* sp.

Cultures of these fungi were obtained on various media ; the kind of culture obtained in each case is described, and the growth of the fungus on the insect host is discussed.

Spicaria prasina was first found in Japan on larvae of *Phlyctaenia* (*Pionea*) *forficalis* ; the author records it on larvae of *Spodoptera mauritia* in Ceylon and on larvae of *Anticarsia gemmatalis* from Florida. *S. araneae* occurs on a spider in Ceylon, and a species described as *S. aphodii* on the beetle, *Aphodius fimetarius*, is probably identical with it. *S. aleyrodis* has been recorded on *Aleurodes variabilis* in Cuba. A species named *Spicaria verticillioides*, on cocoons of *Clysia* (*Cochylis*) *ambiguella*, is probably identical with *Isaria farinosa*. *S. cossus*, recorded from larvae of *Cossus* sp., appears to resemble *S. aphodii* in morphological characters.

Petch (T.). **Entomogenous Fungi: Additions and Corrections.**—*Trans. Brit. Myc. Soc.*, x, pt. 3, pp. 190–201. Cambridge, 15th May 1925. [Received 17th October 1925.]

Further examination of material has resulted in certain corrections and in some cases in the adoption of new names for those employed in a previous paper [*R.A.E.*, A, xi, 133]. Notes are given on various Coccid-infesting fungi, including *Aschersonia papillata*, sp. n., on *Aleurodes* sp. in Ceylon ; *Tetracrium coccicolum* (the conidial stage of *Podonectria coccicola*) on *Chionaspis manni* in Bengal ; and *Tuberculariacoccicola* (the conidial stage of *Nectria vilis*) on *Saissetia* (*Lecanium*) *hemisphaerica* and *Ceroplastes* sp. in Ceylon.

The following new species from Peradeniya were found on Coccids independently of other fungi and are apparently parasitic on them :—*Eriothyrium coccicolum* on *Lepidosaphes* sp., and *Pyrenochaeta sparsibarba* and *Muricularia calva* on *Fiorinia juniperi*.

Ramakrishna Ayyar (T. V.). **A Check-list of Indo-Ceylonese Chalcid Flies (Chalcidoidea).**—*Spolia Zeylanica*, xiii, pt. 2, pp. 235–254. Colombo, 31st July 1925.

This is an attempt to bring together all records of the Chalcids that have till now been noted from the Indo-Ceylonese region, with brief notes from available data regarding their bionomics.

Mahdihassan (S.). **Statics of Lac Production.**—*Jl. Sci. Assoc., Maharajah's Coll., Vizianagaram*, i, no. 4, pp. 125–132. Vizianagaram, Madras, January 1924. [Received 2nd November 1925.]

The author has shown in a previous paper [*R.A.E.*, A, viii, 229] that a certain predisposition on the part of the tree is necessary for the successful introduction of lac insects, and he considers that the tree must not be in a vigorous state of vegetative growth. He has worked out the relations between the lac insect with its intercellular *Monilia* yeast and the food-plant with its symbiotic gum bacteria, and finds that the insect feeds on the proteins formed by the gum bacteria and not on those of the plant, and for that reason the tree, although

regularly utilised for lac production, does not die. It is thought that the gum bacteria, if they could be made to grow in the tissues of another tree, would form equally good food for the lac insect. Attempts are being made to determine which species of insect has intercellular yeasts with a hardy constitution. When the different races of gum bacteria and also of intercellular yeasts have been isolated, it will be easy to determine how each of these are connected with the different kinds of lac. The future of the lac industry therefore depends on the application of knowledge concerning the conditions suitable for certain gum bacteria, which in their turn best feed a certain species of lac yeasts; the tree and the insect will thus become of secondary importance.

SRINIVASAYYA (M.). **The Fundamentals of Intensive Lac Production.** — *Jl. Sci. Assoc., Maharajah's Coll. Vizianagaram*, i, no. 4, pp. 133–145. Vizianagaram, Madras, January 1924. [Received 2nd November 1925.]

The uncertainty of the lac crop, due to the negligent and unscientific methods employed in its propagation, results in eccentric fluctuations of the shellac market, and it is essential that this element of chance should be removed by thorough methods of cultivation based upon understanding of the fundamentals of lac growth.

The propagation of lac is controlled by a number and variety of limiting factors, a study of which has brought the author to the following general conclusions: That nitrogen and carbohydrates are mainly responsible for maintenance of the insects, while special protein requirements are necessary for the active growth of the organism. That the secretory activity is a direct function of the alcohol-soluble resins and the water-soluble gums of the food-plant. That excretion of honey-dew is dependent upon a sufficient supply of the insoluble carbohydrate reserves. That the production of a resistant brood principally depends on the inorganic constituents. The proportion of females in a brood is increased by phosphorus and magnesium, and of males by calcium and sodium. It is noticeable that food-plants which on injury produce a resin, as in the case of *Shorea* or *Trijuga*, yield a thicker encrustation, while those that form only water-soluble gums produce thinner encrustations. It is found that more males are produced during the rains, while the proportion of females is higher in the summer brood, so that the following rainy season crop is a good one. The number of larvae and the fertility of the mother insect vary with the season, with the species of insect, with its nutrition supply, and with the species of food-plant. *Acacia farnesiana* has been found to be a very suitable food-plant for lac growth, the Mysore insect having been reared on this plant to the 8th generation with remarkable success, without any fall either in its resin-producing efficiency or in the vitality of succeeding generations.

[KANNAN (K. K.).] [**Report of the Entomologist.**]—*Ann. Rept. Agric. Dept. Mysore, 1923-24*, pt. II, pp. 10–12. [Bangalore, 1925.]

The emergence of *Amsacta albistriga* was very irregular and corresponded closely with the erratic rainfall; some 55,800 moths were collected. There has been a progressive decrease in infestation by sugar-cane borer, *Diatraea* sp., since 1922.

It is likely that dusting with pyrethrum against mango-hoppers [*Idiocerus*] may prove simpler than spraying with fish-oil soap.

Pyrethrum dusted two or three times at intervals of a week is effective; the hoppers are stupified and drop to the ground, where they die or are carried off by ants.

The measures recommended against *Chelidonium cinctum* (lime tree borer), the coffee borer [*Xylotrechus quadripes*], and a moth attacking cardamoms have already been noticed [*R.A.E.*, A, xii, 60, 522; xiii, 72]. Hand-picking of the caterpillars of *Euxoa segetum* on coffee seedlings gave very satisfactory results. Rubbing off the eggs of *Adisura atkinsoni* on avare [*Dolichos*] from the earliest pods and crushing the caterpillars may prove effective and is to be tested on a larger scale. Various traps were tried against *Achaea janata* (castor semi-looper) without success, but hand-picking as usual proved effective.

KANNAN (K. K.). **The Lime Tree Borer** (*Chelidonium cinctum*).—*Mysore Agric. Calendar, 1924*, pp. 16–18, 20, 1 pl., 1 fig. Bangalore, 1924. [Received 2nd November 1925.]

The contents of this paper on the life-history and control of *Chelidonium cinctum* have already been noticed from another source [*R.A.E.*, A, xii, 60].

KANNAN (K. K.). **The Coffee Borer.**—*Mysore Agric. Calendar, 1925*, pp. 5, 8. Bangalore, 1925.

During the third year of experiments with a coal tar derivative [*cf. R.A.E.*, A, vii, 288] as a wash for coffee stems infested with the coffee borer [*Xylotrechus quadripes*], the trees showed signs of injury. It was found that the substance used was not exactly the same in composition, though the same in name, and the trials have, therefore, been abandoned. In 1923 the beetles were hand-picked systematically during the whole period they occur, between the middle of October and the end of December, and this was repeated in the following October. Hand-picking is likely to reduce the pest to insignificant dimensions under normal conditions in a few years, and it is likely that the expense, which is not high, will gradually become reduced as the insect diminishes in numbers.

ANDREWS (E. A.). **The Thrips Pest of Tea in Darjeeling.**—*Indian Tea Assoc., Scientif. Dept., Qtrly. Jl.*, 1925, no. 2, pp. 60–105. Calcutta, 1925.

The occurrence of thrips on tea, as recorded in existing literature, is reviewed. In Darjeeling the three species known are *Physothrips lefroyi*, Bagn. (yellow thrips or tea-flower thrips), which, being confined to the flowers, is of no importance from the point of view of the crop, and *P. setiventris*, Bagn. (common tea thrips) and *Haplothrips tenuipennis*, Bagn. (black thrips), which occur on the young shoots and on various jungle plants among the tea. In the course of the investigation it was discovered that *H. tenuipennis*, instead of feeding on the tea as was supposed, is predacious on *P. setiventris*. The larval and adult stages are described; the female has no external ovipositor for inserting the eggs into the leaf tissues. It is not present in sufficient numbers to warrant interference with routine measures, such as removing lichens and mosses from the stems and spraying with soda-washes, on its account.

All stages of *Physothrips setiventris* are described; in feeding, the insects make a slit in the epidermis of the leaf, and inserting the end

of their mouth-cone, suck the interior tissues. The females, which possess an external, cutting ovipositor, insert the eggs in the young leaves and buds, near the veins. The eggs usually hatch in 10–16 days, and the larvae emerge on to the upper side of the leaf (or in the interior cavity of the buds), where they feed for about 10 days, after which they go into the soil to pupate ; the adults appear about 3 days later. The larvae pupate in firm soil, so that the depth at which pupation takes place depends on the depth of cultivation and may be as great as 18 inches. Experiments with adhesive bands attached to the stems of tea bushes showed that the larvae drop to the ground for pupation and that the newly-emerged adults fly from the ground to the bushes, although having a weak flight, they sometimes fly to the stems and run up them. The length of the life-cycle varies from about 18 days to about 32. In the laboratory no adults lived more than 10 days, and it appears that not more than 6 eggs are laid in a day. The feeding of the insects, which is almost confined to the upper surface of the leaves, causes the latter to curl upwards at the tips and edges, which are first attacked, thus providing shelter for the insects ; in severe cases the whole of the upper surface of the leaf becomes dry and roughened, and it finally drops. The dry, brittle leaves cannot be used for high quality tea.

Although *P. setiventris* is found on tea throughout the north-east of India, it is only, with rare exceptions, in the hill districts that it becomes a serious pest ; the attack begins about May and lasts until October, and, although in August and September the effect is less noticeable owing to the greater vigour of the plants, yet the numbers of the insects appear not to fluctuate correspondingly. In the Darjeeling district, at the lower elevations (1,000–4,000 ft. above sea level) high rainfall seems to favour the thrips ; above 4,500 ft. where the temperature is lower, the general humidity higher, and the character of the jungle different, the growth of the tea plant and its power of recovery from attack are slower, and consequently the effect of the thrips is far more serious. The indigenous races of tea are more resistant, and recover more rapidly, than the China races. Shade appears to check the thrips. Soil acidity and texture seem to affect the severity of the attack, but the data obtained are conflicting. In Darjeeling the tea is mainly grown on very steep slopes, where the soil is shallow, and the loss of vigour in the plants caused by the washing away of the soil is of great importance and incidentally renders attack by thrips more serious. In weeding and cultivation a straight fork should be used (instead of hand weeding or a short, curved fork), the effect being to lessen the " wash," disturb the thrips in the soil, and increase the depth at which they pupate (thus increasing risk of failure to emerge) ; in addition to the regular weeding and forking, deep digging, in cold, dry weather, is desirable. Unpruned tea bushes produce small leaves suitable to the thrips, but at the high altitude of Darjeeling annual pruning would probably so decrease the crop as to counteract any benefit from decrease of thrips. Elaborate experiments with various proprietary insecticides showed that, in spite of their killing efficiency, no appreciable increase in crop resulted from their use. The conclusion arrived at is that insecticides are valueless without careful and adequate cultivation and the judicious use of manures. If insecticides are used, they must be applied as a very fine spray, in order to penetrate to the sheltered positions frequented by the insects.

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